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GAS JOURNAL

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[Founded in 1849 as the "Journal of Gas Lighting."]

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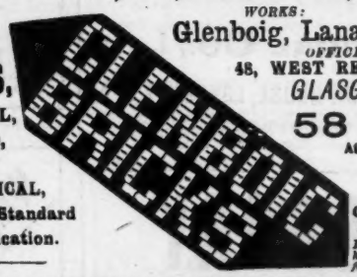

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VOL. CXLIX., No. 2964.] TUESDAY, MARCH 2, 1920. [72ND YEAR.

EDITORIAL NOTES.

Mr. Jones Speaks his Mind.

THE burdens and wrongs of the gas industry supplied Mr. H. E. Jones with ample material upon which to address the proprietors of the Wandsworth, Wimbledon, and Epsom District Gas Company at their meeting last Tuesday. He puts upon the Coal Control Department the largest measure of blame and responsibility for the critical position in which the industry has been placed. What Government coal control has done has hit the industry with a severity that is unparalleled in any other industry, and this through the conditions of statutory regulation being peculiar to the gas industry. The methods of coal control made no exceptions. There was no attempt to harmonize them to, or to legislate for, extraordinary circumstances; they were simply framed, and then lumped on the country (with all their crudity) irrespective of conditions. So the industry has suffered grievously; and its capital has been robbed, and that by Parliament, of a fair return. There is plenty of ground from which the gas industry can (as Mr. Jones did) make scathing attack upon Government coal control, in respect of the questions of quality, distribution, freights, and the arbitrary and untimely imposition of price advances, which last-named have done more to upset industrial calculation and hamper business than almost anything else that has happened during the war. At the same time, the industry has to mould its ideas of coal prices to new pithead costs. We all believe in the miners being, subject to the conditions of the times, properly paid for their work; but reckoning from pre-war pay, the miners have got to the point of excess. Other costs of production have also ascended. Whatever the conditions—whether fair or otherwise, in respect of costs at the pithead—the costs have to be paid by the gas industry in common with all others.

The Government has unfortunately been prominent and consistent in helping to bring all this about; and, if for this reason only, it is for the Government so to revise the legislative enactments of the gas industry that its stability in the financial and industrial world, and as a public service, will be fully restored. They failed to do this when the Statutory Undertakings (Temporary Increase of Charges) Act was passed. What they did then was neither dignified nor just; and while it saved the industry's capital from being divested of practically all its value, it has done infinite harm in the eyes of investors both to the prestige of Parliament and to the industry itself. Parliament would have shown strength by insisting that, until the time came for a permanent revision, the capital of an industry, depreciated by statutory regulation and Government control of its requirements and its products, was entitled at least to a return the standard for which was set by the interest on new Government loan issues. This would have been a fair temporary measure—not a permanent one for a commercial undertaking; and, now that we are talking about permanent readjustment, Mr. Jones ranks himself among those who hold that, in view of the reduced value of money, pre-war dividends upon existing capital can no longer be regarded as having equitable application, though whether it is politic to ask for more as a standard is not discussed by him. On the main question of revision, as he observes, there never was a better prospect than now for the industry, providing Parliament will award to it justice in respect of its financial conditions. However, speaking for himself and not for the gas industry generally, Mr. Jones openly avows that he has little faith in Parliament doing anything commensurate with the justice of the industry's case. His confidence appears to have been shaken by reflection over the fiasco of the previous application of the industry, which resulted in the Statutory Undertakings (Temporary Increase of Charges) Act. The position, however, has altogether altered. The Act was acknowledged as a measure designed to bridge-over the position until there was better ability to size-up the probable economic conditions. There was promise that this should be done; the promise has been renewed; and now is the time for its fulfilment. The new Capital Issues Bill we take as an earnest of the goodwill and sincerity of the Government. The facts for financial revision have hardened; and they can no longer be the subject of serious controversy, except by those of impaired or deficient intellect.

The want of faith of Mr. Jones in Government promises we hope—and he hopes, too—will be disproved by circumstances. His faith and that of his directorial colleagues was (this was not many months ago) vacillating when they were considering the promotion of a Bill, and the incorporation in it of clauses to attempt to effect a financial readjustment for the Company. The notice of the Bill foreshadowed such clauses; the Bill itself showed their abandonment, which indicates that the Board had been persuaded that the Government would, as a matter of honour, make good their promise. It was necessary to come to a decision of some kind. Of course, in these matters where Parliament is concerned, there is always the element of speculation. Speculation existed at the time the private meeting of the gas industry was held towards the end of October, when the President of the National Gas Council (Mr. D. Milne Watson) put the matter very clearly and frankly, and left the industry to make its own choice between reliance upon the Government and the promotion of Private Bills, which latter course would have unquestionably assisted to create a chaotic position such as resulted in the inquiry which gave issue to the Statutory Undertakings (Temporary Increase of Charges) Act. The decision of the gas industry to act in concert (with certain abstentions) was, in our opinion, the correct one. The speculative condition is not yet removed. Supposing Mr. Jones and his colleagues had embodied financial revision clauses in the Wandsworth Bill, what would have been the result? Would it have given Mr. Jones the opportunity for the fight before a Committee for which he yearns? Mr. Jones's blood boils—the blood of everybody in the gas industry is metaphorically speaking in the same state—over the gross injustice from which investors in the gas industry are suffering; but whether or not there will be any fighting over the Private Bills before a Committee is a matter shrouded in considerable doubt.

The Government Bill may only be one empowering the Board of Trade to establish new terms on specified conditions; and we cannot conceive that, if this is so, the Government will allow Private Bills to proceed that do not comply with conditions finally prescribed in the Bill. Until the Bill becomes an Act, there can be no confidence as to its ultimate form in respect of all details; and whatever the ultimate form, it will be the desire of the Government that all gas undertakings should toe the legislative line, and not here and there allow concerns to have special conditions. If the Bill does not meet with the approval of the industry, and with that of those who will be supporting it from the financial and outer industrial worlds, then it will be for the gas industry to fight solidly for its amendment. The Government intend to deal with this matter as applying to the industry as a whole; and where will the interests then

lie of those who have promoted separate legislation—to join the major part of the industry, or to stand by passively while conditions are being cast with which there will have to be general compliance? We are out now for justice; and the whole of the combined power the gas industry can command will be wanted, and not fragmentary action.

The sliding-scale has a staunch defender in Mr. Jones; and he is astonished at its abandonment by certain representative gas administrators. In this connection, we are a little doubtful as to whether the good things Mr. Jones had to say for the South Metropolitan Company in another part of his speech were not intended for the South Suburban Company, because it is the former and not the latter who propose a new method of dealing with profits, so that consumers, stockholders, and employees shall all participate in prosperity, and invested capital shall be in future more strongly protected than the war (which quickly broke through the existing veneer of protection) has proved has hitherto been the case. We have also to remember that conditions are unlikely to maintain a steady level in future, but that the oscillations, there is fair certainty, will be more acute than in pre-war times. Against this, amendment of our old regulations is needed. Defect has to be removed; and there has to be prevision. Is a new level of standard price and standard dividend a sufficiently constructive job in the circumstances? Perhaps Mr. Jones, as a good designer and engineer, will preface his answer by making a few borings into the probabilities of the future. The foundations of the change that it is hoped is to be made now should be well and truly laid.

The L.C.C. and the London Gas Bills.

The London County Council last Tuesday adopted without discussion the report (published in last week's issue) of the Public Control Committee on the Bills of the South Metropolitan and South Suburban Gas Companies. That there was no discussion shows that, generally speaking, the Council consider that this matter, which is of such vital importance to a large industry rendering a public service, is a proper subject to be treated with indifference. This is quite in keeping with the attitude generally displayed by the Council in reference to questions affecting gas undertakings—they practically give the Committee *carte blanche* to do as they please where gas is concerned, and there is no question of considering in a judicial manner the Committee's recommendations. The report that the Committee presented on the two Bills is one of the most one-sided and myopic that we have ever seen; and its weakness will be found by any man of affairs in the total ignoring of the changed economic circumstances of to-day. Thereby the Committee suggest an incapacity for looking at the matter other than from the point of view of the pockets of the consumers of gas; and even from that point of view they have failed to make a complete survey. Had they done so, they would have had to come to the conclusion that no public supply industry continued in the present situation of the gas industry could hope to increase its prosperity (in which the consumers largely participate), or maintain the inflow of new capital to enlarge the industry's capacity for meeting the public requirements. The facts that the industry has had its capital subscribed by the public, that many of the subscribers are small investors of the middle class, and that many thousands of working people are now co-partners, are also matters which a public body like the London County Council think fit to pass by unnoticed. The Committee recognize that a change must be made in the existing sliding-scale regulations, in order to produce conformity with the heat-unit basis of charging; and they also "understand" that the Board of Trade, "at the "instance of the gas industry," have promised to consider the question of revision, which "will give an added benefit "to the shareholders." Long before (as he then was) Sir Albert Stanley relinquished the presidency of the Board of Trade, he stated in the House that the financial terms on which statutory undertakings conducted their business would have to be modified so as to bring them into unison with the altered circumstances. The whole tenour of the report is to show that the proposals are advantageous to the companies and disadvantageous to the consumers; and by it the cloven hoof is clearly betrayed.

The Committee find the proposals of the Companies are inimical to the consumers; they cannot, or will not, see that the present conditions are inimical to the whole gas industry, and to thousands of small investors, who have no one but the gas companies to defend their interests against such bodies as the Public Control Committee of the London County Council. The two Bills (whether or not we agree with all the lines of the proposals) are perfectly honest attempts to set the industry's financial conditions on the changed economic foundations which have come to us as a heritage from the war; and unless these conditions are put on the new foundation, the claims of justice will not be met. A fair dividend on capital is an absolute necessity; a minimum dividend is the preventative of a recurrence of the collapse of the financial stability of the industry such as the war and its apparently never-ending train of changes have brought about. In the minimum dividend of 6 p.ct. as proposed by the South Metropolitan Company (if profits will permit its payment), the Committee see that the entire burden of increased costs will fall on the consumer, even when caused by inefficiency, or extravagance, or mismanagement. What the South Metropolitan Company will think of anyone dreaming that inefficiency, extravagance, or mismanagement could reside within its doors, we dare not imagine, much less express. This is the Company that not long since the Committee were holding up as an example in respect of gas quality and righteous dealing with the consumers; and now they think they are out for robbing the latter! The Committee have very conveniently (it now appears) overlooked the fact that inefficiency, extravagance, or mismanagement would cause the Company to lose any benefit from an increase of dividend upon the 6 p.ct., and that the power of competition would be diminished by not bringing the price of gas down, which competition is a very strong incentive nowadays to economical management, and does not require the sliding-scale to supplement it. The times have changed; and it is peculiar that the Public Control Committee are not yet examining past legislation and conditions in the light of our newly established environment. Perhaps that is too much to expect, as any examination in that light would be rather troublesome to the maintenance of the singular attitude that the Committee have chosen to take up.

The Committee deal with all sorts of matters other than those that would be inconvenient to their position. They do not place any emphasis on the fact that the conversion of the capital of gas companies has time and again been argued before and consistently endorsed by Parliament; nor do they make any very pronounced reference to premium capital, or to the fact that investors buying in the open market paid large sums beyond the nominal value in their belief in the protection of Parliament. There should be, according to the Public Control Committee, one law for gas consumers and another for gas investors. Referring to the South Metropolitan Gas Company, did ever anyone read a more disingenuous statement than this: "To increase the "nominal rate of dividend to 6 p.ct. from the present tem- "porarily authorized 3 p.ct. will require the sum of "£198,297, and involve an addition to the present high rate "charged for gas of approximately equivalent to 3½d. per "1000 c.ft." The present 3 p.ct. ought not to be in existence; the "present high rate" charged for gas is not due to inefficieney, extravagance, or mismanagement; and the honest comparison of the additional sum required should be based on the pre-war dividend, and not on the scandalous 3 p.ct., which is not what consumers should be paying for the use of the capital. Then the sum named would assume a vastly different appearance. Whatever the cost, what sound reason can be advanced against the investor having a fair dividend in relation to the circumstances of the day, and the consumer paying a fair market price for the use of the capital rendering him service? The members of the Public Control Committee may not be financiers of the first rank; and financiers of the first rank in the City of London are agreed that nothing less than 6 p.ct. for existing capital will place the gas industry in a position to command attention from new capital. This is a matter that must not be overlooked. Again the Committee seem to have some objection to gas proprietors securing a "slightly larger proportion of savings "than has been obtained in recent years." This is the Committee that favour incentives to economical management! In connection with the South Suburban proposals, a remark is made to the effect that the alteration proposed will restore to the Company practically its pre-war rate of dividend, notwithstanding that the price charged is more than double the pre-war figure. Why not? The fault that the price is at its existing level is not that of

the stockholders or the administration of the Company. The Committee, too, take the old calorific value and the proposed new one, and appear to try to establish some ratio between them and the old and proposed new standard prices; and they find that the effect is to increase the standard price relative to the calorific standard. New standard prices cannot have regard to old calorific standards; they must to-day be fixed afresh in relation to the new economic conditions.

It is to say the least a matter for considerable regret to find such a body as the Public Control Committee of the London County Council taking its stand upon what is so manifestly an *ex parte* statement, instead of acting judicially, and conceding that, whatever the circumstances, the capital employed in a public service is entitled to fair remuneration. To endeavour to deprive capital of what is commonly recognized as a fair return is equivalent to an attempt to rob. And that is what the members of the Committee would themselves say if their own capital was involved. [In connection with this article, a contribution from a financial expert (published in a later column) should be read. It shows how seriously astray the Public Control Committee have gone in their comments on the position of the South Metropolitan Gas Company.]

Manchester Institution Jubilee.

CONTRARY to the order of things in human and material life, the gas industry with advancing years increases in strength and vitality. We have had a centenary in the gas industry; and jubilees have become quite common. The "JOURNAL" has been a septuagenarian the past two years. Now it is the turn of the Manchester District Institution of Gas Engineers to celebrate their jubilee. This the members did on Thursday last, and in right good British fashion, as our report elsewhere shows. The President of the Institution of Gas Engineers (Sir Dugald Clerk, D.Sc.) was with them, to congratulate them, and wish them the fulfilment of their best aspirations. It was the same date as that on which in 1870 the Institution was established. It has had an honourable career; and many men of note in our history have filled the Presidential Chair. Embedded in the fabric of its history in a manner that few names associated with other organizations can claim to have been, is that of the industry's eminent engineering friend and worker, the late Mr. Thomas Newbigging, D.Sc. The little brochure (for the preparation of which Mr. Henry Kendrick was responsible), that briefly surveys the fifty years' history of the Institution, presents Mr. Newbigging as the central figure in the foundation of the organization. On Feb. 26, 1870, a few professional friends met together to honour him, and to wish him "God-speed" on leaving England for Brazil; and on that occasion came the happy inspiration which there and then resulted in the formation of a Committee that constituted the germ (so to speak) of what quickly grew into a flourishing body. We look back; and the brochure refreshes our memory. The Institution has been second to none among the district organizations in the technical, commercial, and initiative work that has marked progress in the history of the industry. Many men have come, have crossed the stage that the Institution provides, and have passed hence; and many of these men have, through their work, inscribed their names boldly in the annals of the industry. Their work remains; the memory of them still stimulates those who knew them. The traditions of the Institution are carried on, conformably with the times, unfalteringly and with the energy that is characteristic of our Manchester friends. It has been a force in our industry's affairs; its men and its gas undertakings have been an incalculable strength in all movements for the common good. Once get the Manchester Institution to back-up a scheme, and there can be a large amount of assurance that it will go through. From its midst have sprung new movements that have reinforced the strength of the industry—as witness the first junior gas organization, and the Commercial Sections. Other new ideas have also had inception there, which have made for progress. At the foot of the fifty years' survey, we can write conscientiously and fearlessly—"Well done," for the facts of achievement stand out from the independent record of our own pages. What has been will be in the Manchester Institution, and always consistent with the mutations and the larger claims of the times. And why this confidence? Because the right spirit exists among, and cannot be removed from, the gas men of the district covered by the Institution.

The Presidential Address.

THE honour of being President of the Manchester Institution this year, and on this memorable occasion of celebration, fell to Mr. E. H. Hudson, of Normanton, the life of whose Company is exactly that of the organization, which is a coincidence that alone would make his presidency highly appropriate. The President delivered his address at the Jubilee Meeting; and it naturally dwelt somewhat upon the past. Proud as the record of the Institution is, the desire is among the members, and it found expression by Mr. Hudson, to constitute the Institution a still greater source of power and influence. The seed of desire being there, we are making a sad miscalculation if it does not germinate. And this is the opportune time, when the industry, pressed by communities and industries for its staple and secondary products, is trying to escape from the many trammels encumbering it, and to reconstruct, and to proceed to that great development which only awaits the more propitious conditions.

The address dealt with many subjects. We are quite at one with Mr. Hudson in what are tantamount to expressions of regret that so many ideas which have, through presidential addresses and papers, come to the industry from brilliant intellects, have been allowed to lie neglected and dormant, and which, had they been followed up closely, would have been of inestimable help in the position the gas industry now occupies, and perhaps would have lightened the difficulties that have come upon it with such force the last five years. He instances three matters that have appealed to him—the question of differential prices, rating, and joint control of gas and electricity supplies. The President believes that, if the industry had been alive to its needs, the financial terms on which gas companies do business would have been challenged much earlier. His view is that, instead of the ordinary selling price of gas governing the rewards to capital under the operation of the sliding-scale, the average selling price should have been substituted. At Normanton the difference between the ordinary and the average selling prices was 2d. and 3d. per 1000 c.ft. before the war; and last year there was a difference of no less than 6·4d. To take the average selling price might be more equitable for gas companies; but whether it would be regarded by our legislators and local authorities as "just" to the consumers generally is open to question. What is equitable for the companies is about the last thing that is taken into consideration by those who have any hand in making the regulations which control us. We are afraid that, in the result, it would be found that gas companies would be no better off for the change. The average selling price in most places would be subject to more fluctuation than the ordinary price; and if the average price were adopted as the one controlling the amount to be paid in dividend, we may be sure that the standard price would be adjusted to cover the difference. Districts, too, vary considerably; and in some there is greater industrial demand at lower prices (which would reduce the average) than in other districts which are more or less residential. So there would be still more marked variation than there is at present between the dividends of different companies—assuming the standard prices fixed in relation to the ordinary prices were maintained with the average selling price operating. There are some gas suppliers, too, who might, in order to reduce the average selling price, make considerable concessions to large industrial consumers, which would not so much benefit the locality as the individual. We quite agree that the lower-priced gas for industry is an advantage to the ordinary consumers in the effect it has upon standing and administration charges; but we feel confident that the advantage of the average selling price would not be allowed to the share or stock holder unless the standard price was fixed to harmonize with it. Thus the advantage that the President sees is very doubtful of realization.

Regarding the perennial question of rating, there are inequalities and anomalies; and assessment rules and practice of the past are not regarded with the same favour to-day. The actual position is such that that old shadowy person the "hypothetical tenant" would have a very bad time of it were he now in occupation of many gas company concerns. There is room, as Mr. Hudson indicates, for a revision that will provide a basis that will, in the changed circumstances, prove more just to both parties. At the same time, and as things are, many undertakings have secured reductions of their assessments—and a good thing, too, with the rates per pound in many districts standing at

present figures. What has been gained in the assessment has been more than lost in the height to which the rates have risen per pound.

The question of joint control of gas and electricity undertakings is a large one. But there again, things might have been much different to-day if gas and electricity undertakings had established business relations much earlier. What has happened during the war in the matter of preferential recognition and legislation for electricity has had its origin in coal conservation; and now it is only after all this has happened that large electricity stations are showing that economy can be produced and evaporative duty increased by stratifying coke and coke breeze and coal under the boilers. This is the real road to coal conservation in relation to electricity generation, as well as to electrical economy. Before the war the gas industry was groaning under the weight of ugly accumulations of coke; but very little was done to bring conviction as to its value to the generators of electricity. Had this been done, how very different would have been the case that could have been put before the committees of inquiry who sat to consider the way to coal conservation in connection with electricity production, and who only looked in one direction, and no other, with the well-known result. The gas industry was again proved by events to be behind its opportunities; and although the London Coke Sales Committee were attacking an uphill job in trying to instil conviction in electrical minds already resolutely resolved that there was nothing to be gained by the use of coke under their boilers, it has been the exigencies of war that have operated and brought belief to a degree that ordinary propaganda could clearly not have done. If there is proper perseverance in this direction, it should be many a long day before the coke stocks in gas-works again assume the dimensions that they did in the pre-war days—we hope they never will. Beyond this we do not see that there can now be any common working to any extent between the two industries.

The address covers so much ground that it is impossible to comment here upon all its instructive features. It is the work of a progressive man, who is looking to realize the last bit of economy available under the conditions of the times. Figures in the address are the evidence of good managerial capacity, and of the existence of a Board of Directors alive to their trust and responsibilities. The President has vertical retorts; and he steams. A Tully plant of twin-generator type is going in for the complete gasification of coal; the calorific value realized in gas—and that 93 p.ct. combustible—being of an order that will make the mouths water of many who are going into business on a heat-unit basis of charging. We shall hope in due season to hear Mr. Hudson's experiences with this modern type of plant, because it will make a fitting supplement to his highly interesting address. There is one point about the Woodall-Duckham retorts. Mr. Hudson says that "top "heating was the adopted system, and consequently high "makes by steaming have not been possible." Is it that the make per ton with steaming is affected, or is it that the throughput is reduced? Anyway, because top heating was the adopted system at Normanton, this does not mean that the Woodall-Duckham designs are committed to the one heating plan. It would be a mistake to deduce this from what is said in the address.

The address vividly indicates the change and development that are proceeding in the gas industry in this Jubilee Year of the Manchester Institution. The President referred to it as a "memorable" year. We are on the bridge at the moment; and the question in mind is, What is the final nature and extent of those things that will establish the year as a memorable one?

The Blocking of the South Metropolitan Bill.

It looks as though there are going to be serious obstacles placed in the way of the progress of the South Metropolitan Gas Company's Bill—quite apart from any decision the Government might arrive at in view of the promotion of a General Bill by the Board of Trade. A letter from Dr. Carpenter, protesting against gas organizations taking any part in the blocking movement, appears in our "Correspondence" columns to-day.

Summer Time.

It is now understood that "summer time" will commence this year on March 28, and end on Sept. 27. This is practically the same period as last year, when the extra hour of daylight was brought into account from March 30 to Sept. 28.

Gas Fuel for Electricity Works.

An interesting proposal is under investigation at Halifax. The Corporation contemplate spending £170,000 on the electricity station; and the plans include the supplying of gas from the gas-works—thus obtaining at the latter the secondary products of coal now wasted at the electricity station. A deputation is to visit various towns with the view of collecting information.

The President and the Bill.

There will be regret—perhaps it is a little selfish—in the gas industry that Sir Auckland Geddes has consented to accept the post of British Ambassador at Washington; but there will be some satisfaction that such a strong man as Sir Robert Horne, who has been presiding at the Ministry of Labour, is to be his successor at the Board of Trade. The reason for regret on the part of the gas industry is that Sir Auckland has made himself well acquainted with the position of the industry in relation to the proposed legislation, and has proved himself very sympathetic and most desirous to help. But Sir Robert Horne possesses the faculty of quick adaptability and absorption of facts; and he will no doubt soon become master of the situation.

Unemployment Insurance Bill.

This measure has had its second reading in the House. It combines the two theories that all industry is one, and that each industry should bear the burden of its own unemployment. Under the general scheme, all industries (with certain exceptions, including non-manual workers with over £250 a year, and employees of public bodies) will be embraced. But this is a point in which the gas industry will be concerned—particular industries will be enabled to contract-out on consideration of their adopting schemes of their own to which the State will contribute at a reduced rate. Ireland is also shut-out of the Bill; but power exists to add any excluded industries. Workmen are to pay a contribution of 3d. per week, as against 2½d. per week paid by those coming under the Act of 1911; and women are to pay 2½d. per week as formerly. The employers will pay an equal amount; and the State will pay an amount equal to one-third of the combined contributions of workpeople and employers—one-third of 6d. for men, and one-third of 5d. for women. For boys and girls, the payments will be 2d. and 1½d. respectively. The benefits are: Men, 15s. per week; women, 12s.; girls, 6s.; boys, 7s. 6d. The cost to the State is estimated at £2,500,000. The Labour Party accept the measure, but want (as is their custom) all employees to be relieved from responsibility. The policy is to get as much benefit as possible, but to shake off all obligation.

Nationalization and Wages.

It is generally believed (so we are told) that in the inner circles of the labour world, the conclusion has been forced home that the policy of "compelling" the Government to nationalize the coal mines may now be reckoned a failure. The idea of getting a majority to vote for direct action at the Special Trade Union Congress on March 11 has dwindled almost to zero. The Parliamentary Committee have declined to put forward definite recommendations for the occasion, and so the vote will have to be on the straight issue as to whether there shall be industrial or political action. Mr. Will Thorne, M.P., with whom the gas industry has much to do, has spoken very plainly on the subject of direct action. He looks beyond his Union to the masses of working people and the community generally; and he asserts fearlessly that a general strike would be a "foolish and suicidal policy." He believes in political effort. But there are blatant members of the Miners' Federation who declare that nationalization shall come about, even if the miners have alone to fight for it. There is also talk now of an alternative to nationalization, and that is an advance of miners' wages by 6d. an hour, or 3s. 6d. a day, which would represent about £50,000,000 a year, and would mean not far short of 4s. 6d. per ton of coal raised, taking last year's output of 230 million tons. While on the subject of coal, it may be mentioned, regarding the controversy over estimated coal profits, that the Miners' Federation representatives and the accountants engaged by the Government have agreed

that, providing the present conditions as to the quantity and price of export coal continue unchanged until March 31, there will be a profit of £8,000,000 beyond the £6,000,000 estimated in Messrs. Tongue's report; but the Miners' Federation still contend that, if the year to July next is taken, their former estimate will be found approximately correct. It is reported that American coal is now being put free on board at 30s. per ton.

Motor Association and Benzol from Gas.

Among the petitioners against the South Metropolitan Gas Company's Bill are the Automobile Association and other motor organizations. It is a new *rôle* for them to appear as petitioners against Private Bills, though it is quite consistent with the policy of these bodies—particularly the Automobile Association—to do their utmost to bring about the development of home-produced motor fuel. The war, the submarine successes with "tanker" ships, the national railway strike, the curtailing of unnecessary imports, and the price of petrol are strong supports to their action in this matter. The petitioners are out to make it obligatory on the part of the Company to produce the largest possible amount of benzol and other motor spirit. It is not likely the Company will passively submit to this, in view of their past attitude to benzol production by oil-washing. It is urged by the petitioners that, in the national interests in respect of the conservation of coal and the maintenance of key industries, gas undertakings should be required by law to produce the largest amount of benzol and other products. The petition sets out the consumption of petrol in the United Kingdom by motor vehicles—commercial and otherwise. Before the war, it was 100 million gallons, last year it was 200 millions, and it is expected it will approach 300 millions this year. In 1914, the production of benzol—chiefly from coke-ovens—was 21,800,000 gallons. Some 180 gas-works in 1918 were producing 10 million gallons; but since the war the production from this source has fallen to the rate of 3½ million gallons per annum. The petitioners aver that 30 million gallons could be produced from the existing gas-works if scrubbing were universally adopted. It was stated at the meeting of the London County Council last Tuesday that "it was possible the Public Control Committee would be advised to recommend the Council to support the petition." At the rate at which the world's use of motors is increasing, it is predicted that in a very few years the exhaustion of petrol supplies will be unpleasantly apparent. The Prime Minister in the House recently stated that the Government were alive to the importance of extending the supply of motor fuel from British sources, and were prepared to give every encouragement to its manufacture. How far will he be prepared to go in this direction in respect of the gas industry?

PERSONAL.

Referring to the already announced retirement, owing to ill-health, of Mr. WALTER CHANEY, the Engineer of the Saltley gas-works, the Birmingham Corporation Gas Committee, in a report to the City Council, say: Mr. Chaney entered the service of the department in August, 1899, when he was appointed Superintendent of the Saltley works. In 1902 he was made Works Engineer at the Nechells gas-works; and in June, 1908, he was appointed Engineer-in-Charge of the Nechells and Adderley Street works. In January, 1912, he was again given control of the Saltley works; the Adderley Street works still remaining under his supervision. He continued to supervise both works until towards the end of last year, when he had a serious breakdown, and was ordered by his medical advisers to give up work. There is no doubt the strain and anxiety entailed in overcoming the difficulties of the past five years, and in maintaining the output of gas, have materially affected Mr. Chaney's health. He had a particulary anxious time in the early days of the war; for it may be remembered that the large installation of 54 Koppers coke-ovens at Saltley, which were then being constructed by a German firm, was left uncompleted in July of 1914—the German workmen being withdrawn. It was Mr. Chaney's task to complete this work, and also to arrange later for the repair and maintenance of the ovens—work which was included in the contract with the Koppers Company. It has been apparent to the Committee for some time that Mr. Chaney was suffering from ill-health; but he endeavoured to continue his duties. His health has now given way; and it has been arranged for him to retire under the provisions of the superannuation scheme. Mr. Chaney has, during his twenty years' work in the department, rendered very valuable service; and inasmuch as the anxiety of the last few years has undoubtedly contributed to his premature breakdown—he is 53 years of age—the Committee recommend, in computing the amount of his superannuation, that a period of five years be added to his term of service.

To succeed Mr. E. H. W. COOKE as Chief Accountant, the Birmingham Corporation Gas Committee recommend the appointment of Mr. WALTER P. TIMBRELL, who commenced his career in the department when fifteen years of age, and since 1905 has been employed in the Accountant's office.

The Brierley Hill Gas Company have appointed Mr. FRANK HEATH to succeed the late Mr. H. M. Jackson as Secretary. Mr. Heath was assistant to Mr. Jackson for a long period.

We learn that, in consequence of the divergence of views between himself and the majority of the Directors, Mr. Thomas Glover has resigned from the position of Director and Managing Director of Glover and Main, Ltd., Thomas Glover & Co., Ltd., R. & A. Main, Ltd., and Glover and Main (Birmingham), Ltd. There need be no fear that the gas industry will thereby lose the services of Mr. Glover.

OBITUARY.

News is to hand that Mr. HARRISON E. GAWTRY, for many years President of the Consolidated Gas Company of New York, and who was personally known to many "JOURNAL" readers, died on Jan. 29. His death occurred after a lingering illness which, for a number of years, obliged him to abstain from active participation in the business affairs of the Company, in which, nevertheless, to the very last, he displayed the liveliest interest. Mr. Gawtry was the first Secretary of the Company, and later its Treasurer; and his policies, which had been so successful in the development of the Municipal Company, became the policies of the Consolidated Company. They amounted to a recognition of the obligation that a public utility company owes to its patrons, and of the importance of rendering them the best possible service. Among the many notable achievements of his administration were the purchase of the property at Astoria, Long Island, and the construction of coal and water gas plant there upon a scale hitherto unknown in the gas industry. In fact, it was largely due to his initiative and foresight that the Consolidated Gas Company nearly twenty years ago acquired control of all the Gas and Electric Companies then operating in its territory.

GAS-WORKS CONDITIONS IN GERMANY.

THE following is a translation of a paragraph, dealing with the gas industry, in a report (dated Jan. 14) by the Chief of the German Coal Commission. It is reprinted in the "Journal für Gasbeleuchtung" for Feb. 7, and illustrates the present situation of the industry in Germany:

"It all parts of the country medium and small gas-works have long ago ceased production. The dearth of coal is everywhere alike—as is clearly shown by the fact that even works situated in the coal districts and in their immediate vicinity only receive limited quantities of coal, and these not without great difficulty. Wherever any production of gas continues, it is subject to extreme limitations. Recently the hours during which gas supplies are entirely cut off have been everywhere extended; so that at the present time it is by no means unusual, even with large works, to find the supply limited to six to eight hours in the twenty-four. Such works as Hamburg and Harburg have been obliged to limit their hours to five; and Kiel supplies for only three hours a day. The critical situation can be seen from the fact that coal stocks at all the gas-works in Germany only stood at 174,000 tons on Dec. 1, 1919, against 458,000 tons on Dec. 1, 1918, when the monthly consumption was limited to between 700,000 and 800,000 tons."

The annual joint meeting of the members of the Eastern and Western Districts of the Scottish Junior Gas Association on Saturday will take the form of a visit to Messrs. R. & A. Main's works at Falkirk, after which the party will be entertained to tea by the firm.

When the skin has become contaminated with T.N.T., the poison can, according to Dr. Alice Hamilton, be extracted by washing with a 10 p.ct. of sodium hydrosulphite, or of sodium sulphite. Some men have been found to be particularly sensitive to T.N.T. poisoning. A reduction of hæmoglobin is early noticed in the cases of "T.N.T." poisoning; and a blood test is recommended for workers.

Among the March meetings of the Royal Society of Arts, there will be two of particular interest to the gas industry. On Wednesday, March 10, at 4.30, Mr. H. M. Thornton, J.P., M.Inst.Mech.E., will read a paper on "Gas in Relation to Industrial Production and National Economy." Sir Robert A. Hadfield, Bt., D.Sc., F.R.S., will preside. Then on Wednesday, March 24, at the same hour, Mr. Leon Gaster will present a paper entitled "Industrial Lighting in its Relation to Efficiency."

ELECTRICITY SUPPLY MEMORANDA.

One of the striking features of the electrical portion of the display at the Ideal Home Exhibition was the poverty of the information, without close inquiry being made, as to the costs of apparatus and expense of running. It was extraordinarily interesting to stand by, and listen to the answers given to inquirers. The prices of the appliances made many turn away with sarcasm or amusement written on their faces. When some of the visitors found that certain of the small heating appliances could be moved from room to room, and be merely connected up to wall plugs, they were attracted; but when their persistent investigation discovered that, by connecting up to the lighting circuit, a 2 kw.-hour heater would cost, where electricity is (say) 9d. per unit for lighting, 1s. 6d. per hour, the information nearly doubled them up. Or when it was gathered that, where there is a power circuit, and the cost for heating is 2½d. per unit, the running cost of the heater would be 5d. per hour, or 5s. per twelve-hour day, the information caused many a face to change expression. A little electric kettle was on show; and a young lady attendant demurely said it cost only £2 5s. An electric shaving-pot sought, but failed to secure, our patronage at 35s. Several specimens of electric literature were handed to us; but, generally speaking, while the virtues of electrical operation are spread luxuriantly before the readers, there is not much guidance on the financial side. The firm of Belling do give prices and consumptions; but on their electric-fire leaflet, there are stamped the words "Prices cancelled." By the way, on the face of this leaflet we also read that the extended use of electric fires means "an overall economy in coal consumption," and "less coal to be raised from the mines." There are modern coal grates that will give a 20 p.ct. efficiency; while if an electric heater gives 6·33 p.ct. efficiency on the coal used in the boiler-house at a generating station where the consumption is 4 lbs. per kw.-hour, it is all that can be expected of, or realized from, it. How the firm of Belling can justify the statement that by electric heating less coal would have to be raised from the mines, we are at a loss to understand. Certainly at even to-day's prices for domestic coal, the consumer would, by the electrical method, have to pay vastly more for his heating.

High Costs and Business Development.

We have said that in the Belling leaflet the prices of the fires are given, but they have been cancelled. Prices are also supplied in literature handed out at the stand of the South Metropolitan Gas Company; and these are to-day's prices. We look for two fairly comparative figures. A little 1½ kw.-hour heater is at the cancelled price marked at £2 8s. 9d.; and a more imposing gas-fire (with a larger range of serviceability) of the "Metro" type is found priced at £2 8s. 6d. —this consuming 20 c.ft. per hour. If electricity is taken at 2d. per unit, the 1½-unit electric heater would cost 3d. per hour; and at the 100 p.ct. efficiency which electrical men are fond of claiming as being realized by every unit registered by the meter and used for heating purposes, 5130 B.Th.U. would be distributed to the room. The gas-fire selected for comparison, which uses 20 c.ft. of gas would, at the current price of 4s. 8d. in South London, cost a fraction over 1d. per hour; and at 75 p.ct. efficiency would give to the room (the South Metropolitan gas being of a calorific value of about 570 B.Th.U.) 8550 B.Th.U. Therefore gas would impart about five times more heat than this particular electric heater for the same cost per hour—that is to say, for 3·3d. the South Metropolitan gas would discharge into the room heat equivalent to 25,650 B.Th.U. per hour.

A Comparison in Heating.

The "Tricity" people were to the fore distributing literature on electric cooking. In a pamphlet on "The Domestic Demand for Electricity," a lot is said as to the wonderful things that electricity can do in the household. They are mostly old generalities served up in new language; but here again there is not much to guide the domestic consumer as to the costs of apparatus, installation expenses, and so on. There is more information as to what is reputed as being the experiences in large establishments as to consumption, and that old point of controversy "saving of meat," which is laughed out of court by people who understand their business, who know that it is all a question of temperature regulation, and who appreciate the relative advantages of properly cooked meat, and the retention of its nutritious virtues, instead of allowing them to escape from underdone meat. We have seen cut joints of meat well cooked by the electrical method; and they would never have been baked through as they were with only 10 p.ct. loss of weight. Then, of course, it is well known that, by any method of cooking, it is cheaper to cook for a number of persons than for a few. We see in the Tricity book a statement that, in cooking for thirty persons, two units "should" suffice to cook a 10-lb joint, two units "should" suffice to cook the necessary vegetables, and two units "should" suffice to cook all the necessary sweets, &c. The "should" denotes an appreciation of the likelihood of the consumption named being exceeded. Nothing is allowed here for washing-up purposes. Nevertheless six units are expended; and at only 2d. per unit, they would cost 1s. In other words, 20,520 B.Th.U. is all the heat that would be available for 1s.; while the same 1s. would buy 123,120 B.Th.U. from the South Metropolitan Gas Company, and the total cost of the operations would be but a few pence. A table is given in the same pamphlet showing high percentages in loss of weight of meat at an unnamed hospital. What these percentages tell us plainly (our own long experience proves) is that the cooking staff of the hospital has something to learn as to gas-cooker management. The experience there does not square with that at another hospital during the war, where electric cooking had been adopted, and a gas-range was subsequently installed, and kept in use in preference to its predecessor. The experience of electrical operation, too, at National Kitchens does not offer any assistance in the way of corroboration of the manufacturers' statements. High costs of apparatus and energy are not helping electrical apparatus manufacturers to-day; nor is the experience as to maintenance and unreliability. These are matters which cannot be kept secret from competitors, who read electrical literature (plausible enough for the uninstructed) with a more intimate knowledge of the subject than the outside public. It is interesting to note that Berry's Electric, Ltd., has gone in for the "Wunfire" water-heater, which burns a mixture of gas coke and small coal, or cinders and combustible kitchen refuse. This does not look like all electrical operation, nor an earnest electrical expectation that the end of the gas industry is within sight.

Some Cooking Points.

It is observed that the electrical papers are once again publishing articles about supplying cottages and small houses with electricity for various operations. A worse time could not have been chosen for this, with costs as they are. But the housing schemes are here, and the electrical people have to make the best of their conditions. When things were much cheaper, builders showed a very sound reluctance to install electricity in small houses, and they are now more likely to display the same hesitation. Our dear old friend the "Electrical Review," with a beautiful evasion or ignorance of facts, suggests that the superiority of electricity over gas for domestic purposes should not be overlooked, and its growing tendency should receive attention in all schemes of reconstruction. What is this "superiority?" Is it in respect of installation cost? Is it in respect of the most beneficial light for the eyesight? Is it in respect of the cost for heating and cooking and hot water supply? Is it in respect of cost of maintenance? Is it in respect of reliability? It is pointed out that there is no actual combustion on the premises; and risk of fire is greatly reduced. Combustion only takes place when the electric current misbehaves itself; and there have been some gruesome happenings through electrically generated fires. Our friend, however, has a remarkably short memory for such occurrences. Fire places and flues, we are told, become unnecessary with electricity. But the information is not added that where such conditions prevail, very rapid stagnation of the atmosphere is promoted. We are not favourable to midget rooms that electricity would have almost hermetically sealed, in order to assist it to show a better result. Gas only requires a small flue; and there have been some striking expert demonstrations of the saving in building construction—costs and space—by the abolition of the chimney stack, and the incorporation of a small flue in the brickwork in connection with the gas-heating system. The total abolition of flues would mean the tying-up of small houses to electric heating, and the eventual bankruptcy or flight of the occupants. Has intelligence taken its departure from the electrical mind, and installed in its place an incompetence to view things from all points in a practical manner? We would suggest the "Electrical Review" should sit down, and reckon up the cost of electrical operation in small houses. The result would not be an "obvious advantage" to the tenants. To save expense open surface wiring is advocated; anything to economize is considered good enough for these places. We do not think the Editors of the "Review" would be pleased to have such wiring in their dwellings; and yet it would be more appropriate there than in the small houses. If there are any dwellings where the wiring should be hidden and not exposed, it is in those of the poorer people. We need not say why; but it is so. In the gas industry, there is a large knowledge as to where occurs the faster depreciation of gas appliances; where lines are tied to the gas-pipes for the suspension of clothes in rooms, in order to dry or air them; and where other habits are indulged in which are not usual in better class houses. Mention is made of two houses in Glasgow that were electrically lighted and fitted with electric cooking apparatus, and household appliances, and in one case the whole of the operations were performed for £32 a year and in the other £35. We should like to have the details of this outlay in respect of each operation, together with the prices per unit, number of rooms, number of members in family, and then we shall be happy to discuss the figures with our contemporary, in the light of the actual work that could be performed by the energy. The weekly average cost in one case works out to 12s. 3·7d., and in the other to 13s. 5·53d.! Any investigation of the figures cannot be made without complete details.

Small Electrical Talk and Small Houses.

One of the points made by salesmen of electric cooking apparatus is that it causes no smell. Food, according to them, acts in a much more dignified manner when the heat comes from an electric element than when it comes from

Electric Cooking and Smells.

the combustion of gas, coal, or coke. It is wonderful what a partiality foodstuffs have for electricity. Even when cabbages or other green vegetables or onions are cooking, there is no smell when electricity is used; when joints or anything containing fat is being cooked, there is no splashing of the fat on to hot parts, and therefore no smell of burning fat. This is the kind of fiction many electrical people pour into the ears of the public. Those who talk thus must think the world is filled with lunatics; but the part of the world with knowledge of cooking knows that there is a lamentable shortage of commonsense among those who speak to them in this way. The "Electrician" makes a clean breast of this condition. It urges that adequate arrangements should be made for cleaning electric cooking apparatus. "Every cook knows that fat flies into the most out-of-the-way places. All electric cooking apparatus should, therefore, be as free as possible from crevices in which fat and dirt can lodge, and should be so arranged that every part is accessible, and can be easily cleaned. We were told on one stand [at the Ideal Home Exhibition] that this was not necessary, because on that cooker the element never became dirty. As there was nothing between it and the food being cooked except free atmosphere, this was nonsense. Yet it is the sort of nonsense that is still being talked to non-technical visitors, and—to put it mildly—it does a great deal of harm. . . . On much of the electrical apparatus, nuts have to be slacked back and screws unscrewed to get at parts which require cleaning. This means that the cleaning is not properly carried out, and electric cooking soon receives a bad mark because it smells!" Our contemporary urges that the designer must get into his head the fundamental fact that electrical apparatus is not for the skilled worker, but for the amateur; and therefore apparatus must be constructed so as to render cleaning an easy matter.

THE LONDON COUNTY COUNCIL AND METROPOLITAN GAS BILLS.

[CONTRIBUTED.]

THE report of the Public Control Committee of the London County Council in the "JOURNAL" last week is, so far as it concerns the capital of the South Metropolitan Gas Company, one of those misleading half-truths which, whether deliberate or unintentional, generate confused thinking. In fairness, therefore, to those whose money is invested in the ordinary stock of gas undertakings, it is hoped that a sense of justice will condemn the imperfect quality of the report. The sinister omissions are quite unworthy of a public body such as the London County Council, and attention is now directed to these. The report reads:

> "It should be borne in mind that the present amount of ordinary stock issued by the South Metropolitan Gas Company (£6,609,895) includes a considerable amount (£3,285,000) nominally added on conversion of capital into stocks carrying a lower nominal rate of interest. The Company is, in effect, asking to be allowed to pay on the converted capital a minimum dividend which gives an average of 15 p.ct.—in fact, on a large portion thereof the actual rate will be nearly 18 p.ct. On the total ordinary capital (including premiums) now invested in the undertaking, the Company is practically seeking powers to enable it to pay a minimum dividend equal to 10 p.ct. Not only does the Company ask for a large improvement in the present dividend, but it seeks to secure that any movement in the direction of pre-war prices of gas shall benefit the Company greatly. To increase the nominal rate of dividend to 6 p.ct. from the present temporarily authorized rate of 3 p.ct. will require a sum of £198,297, and involve an addition to the present high rate charged for gas approximately equivalent to 3½d. per 1000 c.ft."

The figures of the entire capital of this particular undertaking are accessible to all who understand such matters; and for the sake of simplicity, and to enable the argument to be followed, they are given in a condensed form as represented by the two lines A and B following:

—	Nominal Amount Issued.	Premiums Paid by Investors, but not Eligible for Dividend.	Value of Column 1 Converted in 1896 to carry the Standard Dividend at 4 P.Ct.
A.—Ordinary share capital of the amalgamated companies issued prior to the introduction of the auction clause in 1876	£1,941,490	..	£4,856,900
B.—Issues of ordinary share capital subsequent to the introduction of the auction clause in 1876 . . .	1,383,405*	576,829	£1,752,995
	£3,324,895	£576,829	£6,609,895

Total cash invested: A.—£1,941,490; B.—£1,960,234; total, £3,901,724.
* The issues of this £1,383,405 consist of £248,510 at 10 p.ct. down to the year 1896, and £1,134,895 thereafter at 4 p.ct.

Thus the cash sunk before the auction clauses were adopted in 1876 is contained in line A. It is rather less than the cash invested after 1876, and subject to the auction clauses, as shown in line B. The report singles out, and fastens upon, the smaller cash sum A, deeming it unnecessary to refer to the larger sum B.

The report does not refer to auction clauses nor to premium capital. In line B standard dividend at 4 p.ct. upon a stock value of £1,752,995 is merely £3 11s. 6d. p.ct. on the cash paid by the investor for the nominal holding. But the unfortunate stockholders do not earn even this beggarly return, as only 75 p.ct. of the standard dividend is permitted as a war measure; so that a mere £2 13s. 8d. p.ct. is now earned by the investor on actual cash employed for the public benefit. This serves as a warning of what is likely to accrue from State control guided by "Public Control Committees." A great municipality is paying at the present time no less than £6 8s. 6d. on a million sterling of borrowed capital, notwithstanding that rates, revenues, and properties back the security!

Obviously the 3 p.ct. now paid upon the £6,609,895 is £198,296, or £5 1s. 8d. p.ct. on the cash employed as ordinary share capital. The London County Council want it both ways, and have yet to learn that sweated capital is as injurious to society as is sweated labour, and will produce unsatisfactory results in a very compound form. The policy which places an unreasonable limit to earnings on that portion of capital forming the hereditaments from which income is drawn to meet the growing needs of local purposes, is both unjust and foolish. Would not the time of the London County Council be more profitably expended by broader investigation of riotous profits which should, but do not, add a penny piece to rateable value, but do add to both industrial and social unrest?

LIVING "ON" THE WORKS.

By J. H. BREARLEY, M.Inst.C.E.

THE letter which appeared in the "JOURNAL" for Feb. 17, from "Contented," roused a sympathetic chord, so far as he deplores the common practice of requiring the manager to live "on" the gas-works.

A good deal has been said and written during the last year or two on the subject of humanizing industry; and everyone is familiar with the cry of better houses for workers. While every individual who thinks impartially on the subject must have the greatest possible sympathy for schemes having for their object the improvement of the social and domestic environment of the toiling masses, to the writer's mind these aims cannot claim more urgency than that of the gas manager who is required to reside in close proximity to the works with the charge of which he is entrusted. In describing it as urgent, one has to make allowance, of course, for the relative numbers when comparing the lot of gas managers with that of workers generally. Whereas the latter have strongly organized unions wherewith to put forward claims for betterment, up to the formation of the National Association of Technical Officials, gas managers were dependent entirely on their own individual resource in conjunction with the degree of sweet reasonableness to which the board or committee attained under which they served.

Why should "Contented" have any difficulty in deciding whether or not to join the new Association? Certainly, he has not raised any difficulty. It is formed to look after the interests of gas managers; and it would be a funny Association that merely stopped at the rate of remuneration to be given for services rendered, and paid no regard to the conditions under which the remuneration was earned. In the unions which have already been formed there are precedents without end for seeking to ameliorate working conditions when they press hardly on the worker; and although the writer knows nothing of the intentions of those who have taken a leading part in the formation of the "N.A.T.O.," it would hardly seem to call for assurance that working conditions will come within the scope of its operations.

And why should "Contented" wait for an invitation to join? He expresses a desire to help some of his less fortunate brethren. Merely writing letters to the press, technical or otherwise, will not attain the desire of his heart. He admits he was "compelled" by an unsympathetic board to live in a damp, sunless, and unhealthy spot when he was in the "frying pan" stage of his existence. Could anybody help him then? Certainly his colleagues in the profession could not. Could he help himself? Yes, by getting another appointment. But for one such lucky one, there are (say) ten who are less lucky. If "Contented" stands aloof from the "N.A.T.O.," he stands self-condemned of inconsistency; for it is expressly formed to bring support to managers who are suffering from hardships (financial or otherwise) which call for remedy in connection with their employment.

LIVING "ON" THE WORKS.

The practice of providing a house on the works for the manager, and making residence there a contingent condition of his employment—sometimes with and sometimes without extras in the shape of gas, coals, &c.—is as old, or nearly as old, as the gas industry itself. What was its object? Clearly that the manager should be upon the spot in case of any emergency arising which called

for prompt handling or direction by a competent mind. It was further probably thought by these pioneers of a custom which in very many instances has outstayed its welcome, that the close proximity of the manager in residence would be an effective check upon neglect of duty on the part of employees—such as malingering, dishonesty, and insobriety. That it did have this effect in practice—at least to a great extent—no one who has actually lived in residence on, or adjacent to, the gas-works can deny. When the manager was sleeping soundly, or tossing restlessly in bed, his spirit was always haunting the retort-house; and the men who were employed there never knew how soon that spirit would take bodily shape, as it frequently did on occasion. But the custom of housing the manager on the works was equivalent to putting him on duty for twenty-four hours in the day and seven days in the week; and his point of view never entered into account at all. There were always managers to be got, and always plenty of candidates for whatever vacancy happened to be running. Although some of the applicants may not have been particularly charmed by the prospect of living in uncongenial surroundings, they always had the hope which springs eternal that sooner or later (sooner, for choice) they would be able to move to a better job.

Circumstances are changed to-day. The surroundings of many of the residences built on the works have degenerated. Houses and industries have sprung-up around the gas-works, and what was possibly at one time "not a bad place at all" has become the centre of slumdom. There are quite a large number of gas-works that one can call to mind which are situated in absolutely the worst part of a town; and though in many cases the manager is not called upon to reside there, in others he is expected to do so. Is it necessary? Let us examine the two primary considerations which led to the establishment of the works residence.

Emergencies and Men.

First as to emergencies. There rarely, if ever, happens an emergency on a gas-works where the difference between a manager getting from his bedroom or residence at the works and reaching the works from a more congenial residence situated a few minutes away, would make any difference. Even on the smallest works, short of the manager doing the manual labour himself, there is always a man employed who is familiar with the plant, and competent to deal with an emergency until the manager arrives. Fires and explosions on gas-works are very rare. Certainly in themselves they are insufficient to justify residence on the works by the manager. He might handle the case of a fire a little more intelligently than whoever may be on the spot; but in the case of an explosion the thing would have happened, and probably certain valves already closed, before he could get on the job, however near he might be. But the risk of such emergencies on well-organized works is very remote indeed.

Can anyone say to-day that it makes any difference to the attitude of the men towards their work whether the manager is resident one hundred yards or a couple of miles away from the place? They will do just as much or as little as they please, keeping (with rare exceptions) within such bounds as will avoid dismissal. The conscientious man needs no spiritual supervision, such as residence on works invokes. The unscrupulous man will not be overawed by the gas manager's house or by the gas manager himself. The odds are that the latter will be more afraid of upsetting the man than the man will be of displeasing the manager. The moral or spiritual effect of residence at works on the men employed there may, therefore, be set down to-day at *nil*.

Can anyone assemble sufficient good reasons why a gas manager should be required to live at the gas-works to-day?—the writer cannot; while on the other hand there are a good many reasons why he should live away. Some men have iron nerves and excellent constitutions; but the best are apt to be affected by being too closely and too constantly at the grindstone of their employment or their business. It is recognized generally that a change is good for health; and if it only involves a walk of a few hundred yards, or a tram ride for a mile or so, it makes a wonderful difference to fitness for the duties of next day. "Contented" does not place it too high when he says that it is a cruelty to expect a brainworker to live on the works where his own nerves and health, and those of his wife and family, are often shattered. One can recall to mind many instances where boards of directors or committees have recognized this, and the efficiency of the supervision or management has in no way suffered, but the reverse. It is not good for the manager to live "within earshot of elevator, blower, pumps, &c."

Personal Experiences.

Twenty-four years ago the writer took an appointment which embraced living at the gas-works. The clinking of shovels in the retort-house was anything but conducive to sound sleep, while to be awakened during the night for most trivial causes was not uncommon. The business developed; and, after seven years, new offices became imperative. The manager's house was converted, and a residence was found several hundred yards away from the works. For sixteen years this arrangement prevailed; and the writer can call to mind no instance in which the difference between living on the works and living away from them made the slightest difference to the conduct of the operations. The most alarming emergency came within a month of his severance from the company. A fire broke out at a garage and furniture stores situated in close proximity to one of the company's gas-holders. It was at 2 a.m. The telephone rang; and the writer was apprised of the state of affairs. But the fire had already attained gigantic proportions. He gave hasty directions to the man in charge, as to transferring the gas to other holders; but although the nearest point of the building was only twenty yards away, there was never any real danger of the holder being affected. Within ten minutes, the writer was "on the job," and found that the most urgent need was to prevent any of the thousands of sparks and half-charred material which were carried by the high wind over the whole of the works from setting fire to anything. Within an hour the fire had completely destroyed the garage and furniture depository. The gas-works claim against the insurance company amounted to £5—the cost of the services of men delegated to watch the gas-works plant!

One Saturday afternoon the writer was having a game of golf with one of his directors, on a links which was near to the manufacturing works owned by the gentleman. He (the writer) ventured to remark on the convenient nearness of the links. The director's reply was, "That is all right, but when I am here I can still see that chimney; and I'd as soon see the d—— as that when I'm having a little recreation." No wonder he was a member of another links where the mill chimney was lost to sight, if not to memory. This incident points the moral conclusively in regard to "residence at works." If the owner of an establishment hates to see his premises when closed for the week-end, it cannot be to the good of a gas manager to be part of the stock-in-trade of the establishment in which he is only a salaried officer, even though he may in addition be a stockholder on a modest scale. And, from a life-time's observation, the writer can say without any possibility of good contradiction that the strenuousness of a manufacturer's life, and the responsibilities which it carries, afford no comparison with the strenuousness of the life of a gas manager.

Living on Works should be Optional.

It must not be overlooked that there are many gas managers who count as valuable assets the provision of a house and extras. I see no reasonable objection, however, to any company or committee providing these away from the works or giving the financial equivalent. A gas manager is not an eight-hours-a-day man by any means. If he is away from the works, he cannot help thinking of them and planning for them, if his heart is in his work. The great point is that it is desirable that he should forget them sometimes, if only for the sake of clarity of ideas; and this is less easy when he is subjected to the sounds and sight of them when taking recreation, indulging in hobbies, or joining in the pleasures of the family circle.

Some gas managers resident on works have good houses, large gardens, and even orchards. They would be loth to leave them. No one would desire that they should do so, if it is their choice. This review of the subject is written from the point of view of whether, if a manager chooses to reside away from the works, his selection should be declined. The writer submits that the time has passed, if it ever existed, when residence on the works was really necessary to obtain thoroughly satisfactory management. There can surely be no doubt, if this be so, that this matter is proper subject for the "N.A.T.O." to deal with; and it would be a great surprise to the writer if any other view was taken by those who will direct its destinies.

American Oil-Shales.

In a report which was published in a recent number of the "Board of Trade Journal," H.M. the Commercial Secretary at Washington said there appears to be little reason to doubt that the manufacture of oil from oil-shale is destined, in the not very distant future, to assume in the United States a more prominent place than it now occupies. The consumption of mineral oil and its derivatives is increasing rapidly; and those who used to consider the oil supplies of the United States as practically inexhaustible had not foreseen the manifold uses to which it is now put. The United States Bureau of Mines issued a report in 1918 which stated that the underground reserves of the United States are 40 p.ct. exhausted; while production from drilling has probably nearly attained its maximum. A year later the Bureau estimated that the demand will reach 800 million barrels per annum by 1927, and all known and probably all existing underground reserves in the United States, will be exhausted by 1928. There are, however, oil-shales in Western Colorado which (including those of the adjacent States of Wyoming and Utah) are richer in recoverable oil than the Scottish shales. They are also estimated to be of approximately equal nitrogen content, which is a measure of recoverable ammonia, and are, furthermore, of greater thickness and more easily mined than those of Scotland. In Colorado, too, the shales are susceptible to surface operations. The oil-bearing stratum in Colorado is estimated by the United States Geological Survey to be, on an average, 1500 ft. thick, though one cannot assume that this is all commercial shale—*i.e.*, producing about a barrel of oil to every ton of rock. The gas produced will probably be in excess of the amount required for retorting purposes; but, in the American fields, there will be no convenient market for the surplus. It is expected to use the spent shales as fertilizers, as they contain from 0·5 to 6 p.ct. of nitrates, and small quantities of potash and phosphoric acid. At present there are no commercial oil-shale plants operating in the United States.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Jubilee Meeting.

THERE was a large gathering at the Midland Hotel, Manchester, last Thursday morning—the Fiftieth Annual Meeting of the Institution being celebrated in a special manner. After the business meeting a party of about a hundred sat down to luncheon; and this was followed by a toast-list and an enjoyable musical programme. At the opening of the proceedings, Mr. A. E. Mottram, of Ossett, the outgoing President, occupied the chair; and later the new President, Mr. E. H. Hudson, of Normanton, delivered his Presidential Address. Among those present was Sir Dugald Clerk, K.B.E., D.Sc., F.R.S., the President of the Institution of Gas Engineers; while Mr. John Booth, of Southport, who is the only original member of the Institution still surviving, and Alderman Kay, J.P., the Chairman of the Manchester Corporation Gas Committee, were present at the luncheon.

When the members had assembled, it was agreed, on the suggestion of the President (Mr. A. E. Mottram, of Ossett), that the minutes of the previous meeting should be taken as read; and they were confirmed.

LETTERS OF REGRET.

The HON. SECRETARY (Mr. G. S. Frith, of Runcorn) said that, as this was the jubilee meeting of the Institution, he had sent out invitations to be present to all the Past-Presidents; and he had received in reply letters and messages—which he read—from those unable to attend. They were from Mr. C. E. Jones (President in 1886), Mr. Isaac Carr (1896), Mr. R. G. Shadbolt (1899), Mr. T. N. Ritson (1900), Mr. Charles Wood (1901), Mr. W. Prince (1907), and Mr. E. A. Harman (1916). There were also letters of regret from Presidents of other Associations.

SIR DUGALD CLERK AN HONORARY MEMBER.

The PRESIDENT said that, before proceeding any further with the *agenda*, he would like to say how pleased they were to have with them at the meeting the President of the Institution of Gas Engineers. [Applause.] He was not going to attempt to introduce Sir Dugald Clerk to an audience of gas men. His work for the industry was far too valuable to need anything of this kind. They were very pleased indeed to welcome him among them.

Sir DUGALD CLERK said he felt very grateful to them for adopting him as a gas engineer. His connection with gas was, as a matter of fact, a very old one. He began work on the internal combustion engine at the end of 1876; and then he found it was necessary to study, not only thermo-dynamics and the design of engines, but also the working fluid upon which the engine depended. Had it not been for the work that Murdoch did many years ago, there would have been no internal combustion engine at all; for all the scientific data were determined on the gas-engine. He was not strictly a gas engineer, in the sense of the members of the Institution; but this had made him feel it was the greater privilege to be made first an honorary member of the Institution of Gas Engineers, and then President. He had a very vivid interest in the gas industry and its methods, and could not tell them how many processes he had studied at different times. Perhaps he might be allowed to point out that he had before now taken part in the activities of the members of their Institution. Some years ago, he was invited to give a lecture at the University under Prof. Harold B. Dixon; and he now learned that this was one of a series of lectures promoted by their Institution. Then he came down to Manchester in 1907, to the exhibition for which the Institution were responsible, and gave a lecture on "Gas-Engines," when the late Mr. Thomas Newbigging presided.

Mr. SAMUEL GLOVER (St. Helens) said Sir Dugald Clerk was not only a gas engineer, but he was one to whom any and all other gas engineers would gladly look for advice. He had such a close connection with the industry and with the Manchester district, that no doubt the Institution would be very glad indeed to include him among their honorary members. He would be pleased to propose this.

The PRESIDENT remarked that it was an excellent idea; for Sir Dugald Clerk would be an ideal honorary member. He seconded the proposal, which was heartily carried.

Sir DUGALD CLERK said this was an unexpected honour, which he esteemed highly.

NEW MEMBERS.

The names of the following new members were then read out: Mr. J. H. Clarke, of Chapel-en-le-Frith; Mr. George Dixon, of Lancaster; Mr. R. H. Duxbury, of Batley; Mr. J. H. Ranft, of Lytham; Mr. T. W. Smith, of Whitworth Vale; and Mr. Harold Vernon, of Nantwich.

ANNUAL REPORT AND ACCOUNTS.

The annual report of the Committee for the twelve months ended Jan. 31, and the statement of accounts, were then submitted. The report stated that the membership was still well maintained; the number at present standing at 203—a decrease of three on the previous year. The papers read during the year included one by Mr. William Buckley and Captain Sinnatt, D.Sc., on "Improved Methods for the Analysis of Coal Gas;" and acting on a suggestion contained in this joint paper, a Sub-Committee has been appointed to consider the practicability of installing in Manchester, or some other convenient town, a central laboratory where gas-works tests could be undertaken and instruction given to assistants and junior chemists of gas undertakings. The annual reports of the Lancashire and the Yorkshire Commercial Sections again prove the usefulness of these organizations. The statement of accounts showed, after payment of all outstanding amounts, a debit balance of £22 19s. 5d.

Mr. H. KENDRICK (Stretford) said he noticed an outstanding account for reports of District Associations, £38 5s. Was this on account of last year, or 1920?

The HON. SECRETARY replied that it was for the 1919 volumes. There was an adverse balance of £23 on the year.

Mr. KENDRICK: Have the Committee made any suggestion with regard to meeting this adverse balance?

The PRESIDENT: We discussed the balance-sheet in Committee. It will be seen that there are one or two exceptional items. We are very little in debt for such an Institution; and there is every prospect of wiping-out even this small amount without any increase in subscriptions. We felt, therefore, we should be perfectly safe in going on for another twelve months.

The report and accounts were then adopted.

LANCASHIRE COMMERCIAL SECTION REPORT.

Mr. S. MEUNIER (Stockport) moved the adoption of the report of the Lancashire portion of the Commercial Section. In so doing, he said he would like to draw attention to the fact that the members of the section were gradually and continuously increasing. Looking back some seventeen years, he found that the first meeting of all consisted of about six local gas engineers; whereas the total membership now was 69—there having been an increase of two last year. Thus, after all was said and done, the section had been very well received. Another very gratifying feature in connection with the meetings themselves was that the average attendance was 31—the highest being 39, and the lowest 24. This distinctly pointed to appreciation by the members of the business that was brought before them. Naturally, the question of coal had been a very prominent one during the past year. Among other matters coke and the new suggestions from the tar distillers had received a great deal of attention. Much information had been gathered at the meetings which was useful to them all.

Mr. KENDRICK, in seconding, also called attention to the membership. It was, he said, quite true it was still growing; but there was room for a considerable further addition yet. The number of members of the Institution was now about 215; and the Lancashire Section and Yorkshire Section together did not number more than 140. Thus, though some of the works were duplicated in membership of the Institution, there were still a number of undertakings not represented. The loss was to these undertakings, and not to the members themselves. Speaking for his own undertaking, he was quite certain that it had benefited financially to a very great extent through the information he had been able to glean at the monthly meetings. If they could only bring those of their number who were not members to understand what they lost by not persuading their boards or committees to become members of the section, he was certain they would reap the same benefit as others had done in the past.

The report was unanimously adopted.

The PRESIDENT said the Yorkshire Section report was not yet ready, because the Secretary was also Secretary of the Regional Council. They would therefore have to leave this over.

BENEVOLENT FUND CONTRIBUTION.

The PRESIDENT, in moving that a sum of £5 5s. be granted to the Benevolent Fund of the Institution of Gas Engineers, said they would have liked the sum to be larger; but circumstances did not permit of it.

The proposition was agreed to.

REPRESENTATIVE ON THE INSTITUTION COUNCIL.

The HON. SECRETARY said that three years ago they appointed him as their representative on the Council of the Institution of Gas Engineers; and he would like to say how much he appreciated the honour done him. The rules of their Institution prevented him continuing in the position; and he had pleasure in moving that Mr. E. H. Hudson be elected in his stead.

Mr. SAMUEL GLOVER seconded; and remarked that Mr. Frith's services had been highly valued.

Mr. HUDSON, returning thanks for his election, said the Committee fully realized the good work that Mr. Frith had done, and had hoped that he would prove eligible under the rules for a further term.

Junior Association Representatives.

The President moved, and Mr. Meunier seconded, that Messrs. W. Buckley (Manchester) and G. W. Fligg (Dewsbury) be appointed representatives of the Institution on the Councils of the Lancashire and Yorkshire Junior Associations respectively.

Mr. Buckley pointed out that he was already representing the Juniors on their own Council; and on this account he thought it would be better if they selected someone else.

The President said they knew this, but felt Mr. Buckley was quite capable of taking up the dual position.

The proposition was adopted.

The New President.

The President said it now became his duty and privilege to invite Mr. Hudson to accept the position of President of the Institution for the ensuing twelve months. Mr. Hudson had been a very active member for a number of years, and to his (the speaker's) knowledge had done very useful work for the Institution. He had won the respect and esteem of every member; and they had shown this by unanimously electing to the highest position which it was in their power to offer. Their new President had not had a large works behind him to influence his election, but had won through entirely upon his merits. He had natural ability and eloquence; and doubtless the "Transactions" of the Institution would be the richer for his being passed through the chair. He had much pleasure in calling upon Mr. Hudson to take up his new position.

Mr. E. H. Hudson, of Normanton, who was cordially received, then took the chair, and proceeded to move a vote of thanks to the retiring President. He did this with particular pleasure, because Mr. Mottram had taken the chair (in a way) to fill a gap, caused by his own inability to submit his name to the members that year. He felt then that, at the end of the war, with a small works, he would not be able to give any time to presidential work. He did not know that the situation was now very much easier; but at that time Mr. Mottram consented to come from the Junior Vice-Presidency to the chair, and to allow him to remain Senior Vice-President. Mr. Mottram had been a very able President, and had shown that he had the interests of the Institution at heart.

Mr. Meunier, in seconding the vote, also expressed appreciation of the work done by Mr. Mottram during the past year, and the willingness with which he had stepped into the breach. He had certainly done his best, and his best had been very good.

The vote was carried with applause, and briefly acknowledged by Mr. Mottram.

Mr. Hudson then proceeded to deliver the following

PRESIDENTIAL ADDRESS.

It is fifty years to-day since the Manchester District Institution of Gas Engineers was founded. A number of gas engineers gathered together for the purpose of making a presentation to the late Mr. Thomas Newbigging, who was leaving this country to take up the appointment of gas engineer at Pernambuco. At the gathering it was suggested that a Society should be formed to enable them to meet together periodically. Of the founders, only one is at present alive—Mr. Booth, of Southport. Among them was a desire for mutual conversations; but it was found that interest quickened in a remarkable manner, for according to the records, on Aug. 31, 1871, Dr. W. Odling, F.R.S., of London, presented a paper to the Institution. It has had a most successful career, until it now includes in its membership most of the engineers in the area—the roll numbering 203 at the end of 1919. Its work has kept pace with the advance of the industry; and it compares very favourably with other District Institutions in its sphere of usefulness.

The time of its inception synchronizes with the founding of the Company I have the honour to serve, and with my own advent on this mundane sphere. With no competition, and coal at 5s. 9d. per ton of 21 cwt., one realizes that the lot of the gas engineer of those days was a happy one compared with present-day conditions; and "conversations" would appear to be a very apt word to use as a reason for their meeting together. But a span of fifty years in a progressive industry is bound to completely transform its methods.

The Institution soon developed into a Technical Society; and from that time every innovation has found adherents willing to give their experience and advice for the benefit of their colleagues and the welfare of the industry. It has had able men to fill the Presidential Chair; and their addresses have contributed largely to our technical literature—being full of valuable advice and criticisms upon questions of the moment. We have advanced from mere "conversations" to communications of a highly technical character.

During the whole of this period the Institution has had an elected Council to manage its affairs; and the rapid changes in the industry and the varied interests involved have provided for their consideration problems which have made their duties of late years both responsible and arduous. I think there can be no two opinions as to the necessity to the industry of such Institutions, as without the opportunity of discussions upon research work, inventions, and even general working, the spirit of enterprise would be much less pronounced, and progress stifled.

The time is now opportune to consider whether the Institution cannot become a greater source of power and influence. For the past five years the industry has been plunged from one morass to another, until you need no reminding of the deplorable conditions which prevail—due to the exacting statutory restrictions which hamper it. If we refer to the Presidential Addresses given by my predecessors in the chair, we find that these contributions, valuable as they are, were applauded as they richly deserved to be, and then relegated to the shelves of our libraries for future reference. Had some of them been taken as a sign of the times, and that conservative objection to changes which has been ever-present in the gas industry overcome, I feel quite sure that the industry would not be suffering under the unjust and intolerable conditions which hinder it at every turn.

It would be a lengthy task to go through many of these addresses; but I will refer to three which have a bearing on the question. One gave a most elaborate scheme for differentiating in the charges for gas, and proved conclusively that the existing system was not in harmony with the changed conditions of supply; and if the industry had been alive to its needs, the old bases would have been challenged and possibly a basis of average selling price substituted.

Another dealt with the question of rating, showing the inequalities and anomalies that existed; and at the present time is there anyone who can defend the existing system, which has become obsolete? An apt illustration was given in an appeal by the Woking Gas Company, during the hearing of which it was clearly shown that the works had no "letting-value," and therefore they could not be assessed. I have had rating appeals to contest; and although ostensibly working on a "hypothetical tenant" system, I discovered that whatever valuation was arrived at, regard to the percentage of total income as a basis would ultimately decide the issue.

Then I would refer to the suggestion of the late Mr. J. G. Newbigging that, the interests of the electricity and gas industries being somewhat analogous, joint control would obviate useless competition and develop each in its proper sphere.

The first of these illustrations deals with a subject which ought to have a very great bearing on any sliding-scale conditions embodied in the proposed legislation in connection with financial hardships. Such a system opens the door wide for developing the use of gaseous fuel both for domestic and industrial purposes; and it certainly calls for a revision of the present sliding-scale conditions which assume the price charged for gas as that paid for at the highest rate.

I submit a table showing that the average selling price of gas at Normanton has been considerably lower than the sliding-scale price governing dividends; and it would be more equitable to the Company, and just to the consumers generally, if the average selling price was taken as the standard selling price. It would conduce to the development of the industry on broad competitive lines.

	Gross Profit.	Average Selling Price.	Sliding Scale Selling Price.	Sliding Scale Dividend.	Dividend Paid.
	£	s. d.	s. d.	P.ct. P.ct.	P.ct. P.ct.
1910 .	3747	3 0·1	3 2	14¼ & 11¼	12 & 9
1911 .	4037	2 11·2	3 2	14¼ & 11¼	12 & 9
1912 .	3086	2 11·2	3 1	14⅛ & 11⅛	12 & 9
1913 .	4773	2 11·1	3 1	14⅛ & 11⅛	12 & 9
1914 .	5027	2 11·2	3 1	14⅛ & 11⅛	12 & 9
1915 .	3561	2 11·0	3 1	14⅛ & 11⅛	12 & 9
1916 .	3022	3 1·9	3 4	13⅞ & 10¾	12 & 9
1917 .	3178	3 4·8	3 7	13 & 10	12 & 9
1918 .	3356	3 6·9	3 11	12 & 9	11⅛ & 8¼
1919 .	3522	3 8·6	4 3	11 & 8	11 & 8

With regard to the second illustration, the actual position to-day is such that with most undertakings the assessable value for rating purposes under the system now in vogue would be a very negligible sum. The system has become unacceptable to the rating authorities, and places the undertakings in the position of being assessed on some principle it cannot contest. It is a subject to be tackled vigorously, with a view of arriving at a basis which is just to both parties.

The references made by the late Mr. Newbigging to dual control touch the fringe of great possibilities. The present attitude of the authorities towards the gas industry and its booming of the electrical industry is a question actuated by "political fancy ignoring practical knowledge." During the year much has been written on coal conservation; and it has been assumed that, by the establishment of huge electrical stations, the problem will be solved. So it became incumbent upon the gas industry to act in its own defence. Fortunately, it could appeal to men held in high esteem in their respective spheres of work.

Sir Dugald Clerk, whose knowledge of internal combustion engines stands pre-eminent, and Prof. Cobb, who is one of the country's first experts on fuel, and Prof. Smithells, of the Leeds University, were asked to report on coal conservation and the coal gas and electric supply industries of the United Kingdom. These gentlemen made an exhaustive investigation, and presented an analysis of the proposals, showing that whatever advantages the electrical scheme might possess, it was hopeless to expect that it would lead to the conservation of coal. It is very significant that the results of the investigations of these eminent men have not been challenged. Surely then the lines suggested by Sir Arthur Duckham—to deal with this important question having regard to the whole of the agencies distributing light, power, and heat—is the only course that will lead to coal conservation. If then these agencies

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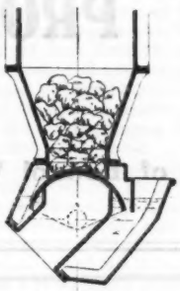

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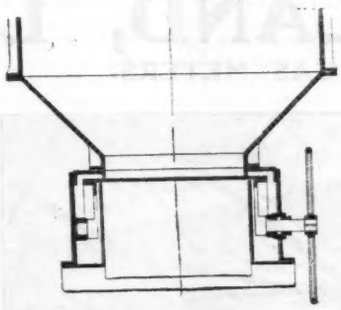

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WARWICK ROAD, GREET, BIRMINGHAM

were working for a common good, the internal combustion engine would become a much greater factor in coal conservation than it is to-day, and we should find that in the proposals of the late Mr. Newbigging there was something very deep-rooted, inasmuch as without dual control the electricity industry might easily become the best customers for gaseous fuel.

Then, again, in connection with our transactions, many subjects are brought before the members—sometimes in experimental stages which lack definite conclusions, and suggest further investigation. I would refer to one brought forward in the early days of the war, when the question of pitch was causing great anxiety owing to the inability of the distillers to take raw tar from the works. The carbonization of small percentages which was shown to be possible was not sufficient to relieve the situation; but there the subject was left for each engineer to act on his own inclinations. Had the investigations been continued, other means of disposing of the pitch would have been discovered.

The calorific values of coal, coke, and pitch are as follows:

	B.Th.U. per Pound.	Per Cent. Value.	Relative Value per Ton.
Coal	13,361	100·0	30s. 0d.
Coke	12,634	94·5	28 4
Pitch	15,896	118·9	35 8

It will be apparent from the above table that as a fuel pitch has a higher value than coal—possessing 19 p.ct. more B.Th.U. per lb. It can be used for boiler firing with satisfactory results.

These are all-important matters which the present procedure of the Institution relegates to a place of obscurity; and I think the Institution should introduce some system of investigation and research into questions of importance to the industry brought forward by any of its members. In this way some spade-work might be done in connection with the work of the National Gas Council, to whom matters of importance would be referred in a concrete form. Then we might look forward to the time when the industry will cease to be governed and its progress shackled by obsolete Acts of Parliament, as legislation could be introduced to meet the changing conditions in the industry, whose great aim in the future will be to provide cheap gaseous fuel as a means of conserving the nation's greatest asset—coal.

The year 1919 will stand out very prominently in the history of the gas industry. The excellent review given in the Technical Press makes it unnecessary to draw your attention to the important changes which have been introduced; and I should like here to pay my tribute to the respective technical journals for the excellent way in which they have served the industry. Starting the year with an exhortation for a progressive policy, warning us not to follow the old path which men passed with self-satisfaction, and to have a deliberate intent and resolve not to wait for legislation, urging it to protect the gains made by the chaos in war-time conditions, to take advantage of so favourable a moment for asserting its claims for a helpful recognition from the State for whom it has done so much, defending the industry from outside attacks and from misrepresentations, it gives prominence to statements of facts brought forward from time to time in defence of our rights. The only regret that I personally have is that such excellent matter is confined to those connected with the industry.

There are two matters, however, to which I wish to refer.

THE FOUNDATION OF THE NATIONAL GAS COUNCIL.

Hitherto the Institution of Gas Engineers and the District Associations have performed their respective parts in connection with the industry, and of late years the British Commercial Gas Association has played no small part in furthering its interests. Yet there has been no strong force to speak and to act for the industry as a whole; and consequently the industry fell a victim to circumstances. These conditions roused the industry from its lethargic state; and the fiftieth year of our existence marks the birth of a strong National Gas Council. As your President, let me appeal to all connected with our Institution to give whole-hearted support to the National Gas Council, so that with the combined weight of the whole industry its influence will be largely increased.

The annual report shows the volume of interests involved; and although most of its work has been of a defensive character, one hopes that when arrears are overcome, it will have a constructive policy, so that the industry can be governed and directed from within.

REPORT OF THE FUEL RESEARCH BOARD.

The other matter is the report of the Fuel Research Board, which is to form the basis upon which new legislation will be framed.

The suggestion of the Fuel Research Committee, that gas of a much lower grade in heating value than that hitherto sanctioned by the Board of Trade, the experiences during the war, the regulations adopted from time to time with a view to the conservation of coal, and the universal experience of the efficiency of lower-grade gas, have established the fact that the high-grade gas supplied before the war will not again be resorted to. The temerity of engineers in pronouncing for a definite grade of gas is one of the marked features of the utterances during the last year. As the reduction in lighting value of gas was brought about by stages, surely the proper course to adopt is that of a gradual fall, which would prevent the disturbing of existing appliances at one fell swoop. I feel constrained to say that an engineer supplying a 450 B.Th.U. gross gas will be as free from complaints to-day as when supplying a 14-candle power gas under the old regime; and this standard will allow of moderate variations without any disturbing effect.

If, however, an attempt is made to supply 400 B.Th.U. gas with existing appliances, it is inviting trouble. This point seems to have been seized upon by the "Super-Gas Refiners," who have (as a Fuel Economy Committee of the British Association) been recently received by the Board of Trade, and who also seek to have embodied in any new legislation, conditions which would strangle the industry rather than relieve its burdens; and no doubt their acceptance of 450 B.Th.U. gas is prompted by their knowledge of the defects of much apparatus at present in use.

We know that a much lower grade gas than this can be used to great advantage in gas-engines and other apparatus properly adjusted; but we must have regard to the fact that these could only be supplied from the town mains, and the gas would not do for general use.

The question of turning-over to selling on the thermal basis is one of such magnitude that I for one lament the secrecy with which the agreed terms are still being guarded. The industry ought to know what they are, and voice its opinions in a case of such importance.

The illuminating article by "Engineer" in the "GAS JOURNAL" of the 16th of January shows how many sides there are to this problem; and in his way the writer proves that the making of water gas as a diluent for coal gas will be the least economical process at present in vogue. This is assuming that the industry is to be allowed to make what grade gas it likes, to be sold on a B.Th.U. basis.

It would be extremely difficult to get apparatus suitable for varying grades of gas; and it would be far better in my opinion to establish a gas of some degree of uniformity.

There is also another very vital question with respect to arriving at the basis of charging by the therm, in relation to the present charge per 1000 c.ft. The financial hardships at present hanging over the industry would be infinitely greater but for the relaxed conditions as to quality; and unless any new conditions bear a direct ratio to those prevailing rather than to those operating before the war, we may find the "relief" may easily become an additional "burden."

COAL CONSERVATION.

So much has been said and written on this subject that one feels somewhat diffident about following in the wake of the able men who have dealt with it; but there is one aspect which has never been touched upon. We are promised legislation to govern our industry, and great prominence is given to the question of inerts in the gas to be supplied. Now it has been proved conclusively that the percentage of inerts matters little if the value of the gas is up to a suitable calorific standard; and as heat units only are to be paid for, on the face of it there is no injustice to the buyer who is not buying inerts but the B.Th.U. supplied.

If, then, the guardians of the public interests are so imbued with the desire to obtain for them the hall-mark of purity, is it too much to ask that their attention should be directed to ensuring the supply of coal without inerts, the sale of which differs in a marked degree from the inerts in gas as the suffering public has to pay for them. Assuming the modest percentage of 2½ removable inerts in the coal, the annual consumption being 250 millions, then 2½ p.ct. would represent 6,250,000 tons. This deleterious matter is handled on occasions no less than ten times before being ground-up in a mortar mill or otherwise disposed of. This represents a total handling of the large volume of 62½ million tons of foreign matter. The enormous cost of this is incalculable; and when to it is added the lower efficiency of the coal for gas-making, steam-raising, or domestic use, and the arduous labour ofttimes involved, does it not suggest that a great national saving would be effected by removing the dirt from the coal at the fountain head? The cost of so doing would be infinitesimal compared to the cost entailed in the repeated handling; and as the consumer would only be too willing to pay more for the cleaner coal, it should prove economically a sound proposition for the colliery companies. Such treatment would be the means of our producing coke vastly improved as a domestic fuel—being cleaner and containing much less sulphur.

NORMANTON GAS COMPANY.

The Company with which I am connected was established in 1869, and held its first meeting of shareholders on the 26th of February, 1870, exactly fifty years ago to-day—rather a remarkable coincidence. The area supplied is a mining district and a large railway centre. The Company contested the question of damage caused to gas-mains by subsidence; and the decision in the case which went to appeal is now the law of the land. It provides that a gas undertaking has the right of support for its mains; but it must pay for the coal left in to give the support. A colliery company giving notice of its intention to work any seam of coal proceeds with the work, unless the gas undertaking takes steps to purchase the coal to support the mains. It would be a rare occasion for such a course to be worth while.

I took over the management in 1895, with a plant varying very little from the original erected in 1869-70—the make of gas then being 30,500,000 c.ft. per annum. The advent of the prepayment meter presented the means for development; and from that time the Company has made continued progress.

Commencing in 1898 extensions were entered upon, and purifiers, carbonizing plant, exhausters, governors, boilers, and gas-holders were all in turn renewed and enlarged. A Holmes washer

and a Livesey washer were also installed; all the plant except condensers, station meter, and the inner lift of one gasholder being replaced. These renewals were all charged to revenue; and where the cost was considerable a suspense account was created and liquidated over a period.

In the year 1914 the carbonizing plant consisted of eight regenerative settings of eight retorts, each 10 ft. by 21 in. by 15 in., and hand-charged. As the replacement of stokers had become a very serious problem, alternative schemes of stoking machinery and vertical retorts were considered. It was decided to erect a 250,000 c.ft. per day vertical retort plant; and to supplement this with some of the horizontals during the time of heavy winter load. It required some courage to practically abandon the horizontal bench, which was in excellent condition and giving good results; but the financial advantage fully justified the change.

The foundations of the vertical retorts were laid the day war broke out; and gas-making commenced in April, 1915. From that date financial and labour troubles became intensified; and the installation proved to be a most fortunate investment, as four men were capable of producing with the plant as much gas as ten men with the horizontal retorts. The advantages, therefore, compensated for the adverse conditions which came in the wake of the war. The vertical retorts selected were the Woodall-Duckham Company's settings of four retorts of a capacity of five tons each per day and heated by two producers. The unit of 60,000 c.ft. per retort is too large for small works; and much smaller units have since been introduced. Top heating was the adopted system, and consequently high makes by steaming have not been possible. The make of gas—including that from the horizontal retorts worked by very indifferent stokers—has been as follows:

1914.	11,163	c.ft. per	ton of coal.
1915.	11,255	,,	,, ,,
1916.	11,554	,,	,, ,,
1917.	11,268	,,	,, ,,
1918.	12,513	,,	,, ,,
1919.	13,533	,,	,, ,,

The coal is put through a breaker, and elevated into a hopper placed on girders sufficiently high for a bogey to go under a bottom shoot. The bogey is then run into a cage and taken by lift to the feeding-hoppers. The coke is dropped into a bogey which is raised by the same lift to a platform 10 ft. high, and then by an overhead runway to the coke-stack. When erected it was worked by two men on each twelve-hour shift. It now requires two men on each eight-hour shift. The setting has no surrounding house; and although a saving in capital cost, it follows that there is greater fuel consumption, due to climatic conditions.

In the same year two 20 ft. purifiers were put down in front of the existing purifying plant; and these again improved the labour position.

The gasholders are both on the Gadd and Mason principle. They are 80 ft. three-lift, and 76 ft. two-lift—the former with ground carriages and outside guides; while the latter is one of the old type with the carriages under the cupping (and consequently immersed in the tank) and inside guides. The improvements in the modern holder were exemplified this winter, when it was necessary to repair the cupping. The tank had to be emptied so that the carriages could be removed to enable the outer lift to be raised vertically. This was a dirty and costly business.

In carrying out extensions, improvements, and renewals, initial costs may appear heavy; but, roughly speaking, if one can see a saving of £150 per annum, an expenditure of £1000 is easily justified.

To meet a demand for high-pressure lighting, a main was laid in the centre of the town, and a compressor of the Keith type was installed. But when outside lighting was prohibited, the supply was suspended and has not yet been revived, owing to lack of opportunity.

A tar-dehydration plant of the Hird-Chambers' type was put down in 1916 for the recovery of benzol; and when the need for this ceased, oil-washing was abandoned, and the plant was used for the preparation of tar for road-spraying. This has proved a good investment.

Nearly every house in the district has a gas supply laid on, and for further developments one is waiting for the erection of new dwellings.

The following table shows the progress of the Company:

Year.	Gas Made Thousands.	Number of Consumers.	
1895 . . .	31,800 ..	560	
1900 . . .	49,909 ..	1332	
1905 . . .	53,851 ..	2539	
1910 . . .	63,837 ..	3407	
1915 . . .	73,174 ..	4035	
1919 . . .	67,599 ..	4060	(war conditions).

The policy of the Company has been to deal generously with the consumer. Dividends at less than the statutory rate have been paid when profits warranted higher rates; but the object was to develop the business, and maintain a steady dividend. This has proved a distinct advantage during the war, as a margin of 10d. per 1000 c.ft. existed in the price charged for gas before the dividends were disturbed; and these were maintained until the end of 1917, when dividends had to fall 1 p.ct., at which they remained until June, 1919. The advances since that date, to meet the heavy demands for coal and labour, necessitated an advance of 8d. per 1000 c.ft., reducing the dividends a further 2 p.ct.; while for the current year the ruling dividends will be at 9 and 6 p.ct. on the 10 and 7 p.ct. stocks respectively.

The slot-meter installations have been liberally treated in the supply of fittings, as you will no doubt remember in my paper on "Ideas, Old and New." I hold that, after the initial cost of the installations, the supply of fittings (which will increase the return on the capital cost) should be encouraged.

In the case of ordinary consumers, we find that a free supply of ring-burners and accessories is a very small cost compared with the cost of installing gas to the premises, and in cottage property will bring in a return equal to the lighting load. Free attention to fittings was also given to this class of consumer before the war; and I hope it will again be resorted to. But at present we have been compelled to make a charge for the actual time expended on the work.

The Company has been fairly progressive. It does not pay to stand still. You must take advantage of innovations to cheapen production on the works and encourage consumption in the district. What success has been achieved has been the outcome of a united board of management and implicit confidence between them and myself.

SURPLUS GAS FROM COKE-OVENS.

During recent years the rapid advance of coke-oven practice has resulted in the production of a large quantity of surplus gas; and since the introduction of the regenerative system of firing, the quantity has considerably increased. In a few instances this gas has been taken by gas undertakings, and used for lighting and heating purposes; but the general custom is to use it under boilers for the generation of steam, and in internal combustion engines for the production of power.

In coke-ovens the amount of gas made per ton of slack carbonized is roughly 11,000 c.ft. of 450 to 500 B.Th.U. gas; and if half of this is required to heat the ovens, it leaves a surplus of 5500 c.ft. per ton. Little economy appears to attach itself to the burning of this gas for steam-raising where a cheap slack or coke is available. Therefore, its disposal seems to rest upon much closer co-operation with gas authorities, particularly where a supply of coke-oven gas is near at hand. In America, it seems to have received greater consideration; and cases have been cited where towns and cities have been totally supplied with coke-oven gas for light, heat, and power.

With gas authorities, gas is the product of primary importance, though the bye-products are not to be despised as a means of revenue. In coke-oven practice, the product of first importance is coke—gas coming very near the last. Therefore closer co-operation between gas undertakings and the coke-oven people would enhance the value of what is now the least valuable of their products.

There can be no objection to the quality of the coke-oven gas, for the general methods of coking point to a yield of a fairly good gas, quite suitable for general use, and equal in quality to that which the majority of gas-works are at present supplying. Your Council are at present giving some consideration to this question; and, without anticipating in any way the result of their inquiries, it would appear to me that there are two important factors to be considered and overcome. The first and most important is that of cost. It must be impressed upon the coke-oven people that this surplus gas is the least valuable of their products to them, and must be sold at a price which will show a considerable margin to the purchasing authority against their cost of production. The other is that they must be jointly responsible with the gas authority for a constant and satisfactory supply. These questions overcome, other minor matters will be easy of adjustment; and then there appears no reason why this surplus gas should not be utilized to the best advantage and become a factor in the conservation of coal by the provision of gaseous fuel at a reasonable price.

COMPLETE GASIFICATION OF COAL.

A general understanding having been reached between the Fuel Research Board and the National Gas Council on behalf of the industry as to the standards to be embodied in the proposed legislation, it behoves all gas engineers and gas authorities to place themselves in a position to comply with the proposed new regulations, and to take the fullest advantage of the opportunities extended to the industry to manufacture gas of the standard best suited to the district supplied. The majority of the members of the Institution have charge of small and medium-sized works; and it is to these my observations will particularly apply, as the cost in larger works should show a greater contrast, and consequently would not bear the same comparison.

The carbonizing methods of these works include hand-stoking, machine-stoking, and in a few instances vertical retorts, in all of which the greatly increased carbonizing costs and inferior coal have caused a burden almost crushing in its severity. To meet these conditions, one's thoughts are directed to new ideas and new methods. The times are extraordinary times; and the idea of scrapping obsolete plant cannot be entertained, as structural steel work and castings have advanced in price far in excess of their value, and must eventually fall considerably. This makes the problem of extensions or renewals a most difficult one to solve. Experience, however, has proved that a water gas plant of some type is the cheapest auxiliary to instal for the economical production of gas and the conservation of the coal supply of the country, and is the best means of obtaining the greatest number of heat units from coal in the shape of gaseous fuel.

COSTS AT NORMANTON.

Year.	Coal Carbonized per Ton.	Cost per 1000 C.Ft. Made.	Purification per 1000 C.Ft. Made.	Wages per 1000 C.Ft. Made.	Maintenance and Sundries at Works per 1000 C.Ft. Made.	Gross Cost into Holder per 1000 C.Ft. Made.	Net Cost into Holder per 1000 C.Ft. Made.
	s. d.	s. d.	d.	d.	d.	s. d.	s. d.
1900	12 7·34	1 3·19	0·36	2·58	3·86	1 9·99	1 0·53
1905	9 1·87	0 10·80	0·38	2·83	3·36	1 5·37	0 10·04
1910	10 7·73	1 0·01	0·21	2·62	3·61	1 6·45	0 10·13
1914	12 9·48	1 1·72	0·25	2·91	1·97	1 6·85	0 10·53
1915	14 9·92	1 3·81	0·12	4·06	4·89	2 0·88	1 4·15
1918	22 7·33	1 9·68	0·08	4·42	4·14	2 6·32	1 6·69
1919	28 4·31	2 1·12	0·11	6·21	5·84	3 1·28	1 11·36
1920	Six summer months (estimated)			10·35			

I have always been of a progressive turn of mind; and in 1914 I put down a vertical-retort installation of a capacity of a quarter of a million cubic feet per day. At that time the scheme showed great saving in labour; but labour conditions have so materially changed, and the cost of upkeep is so great, that unless the plant is on full output the carbonizing costs are extremely heavy. To economize in this quarter, I had decided to stand the vertical installation off during the summer months, and to work the horizontal settings and a water gas plant.

Since the introduction of manufacturing water gas it has made great strides both in large and small gas-works, but not to the extent which was at first anticipated—chiefly owing to the many peculiar characteristics which water gas possesses—its low calorific value, high specific gravity, non-luminous flame, high velocity of combustion, and its CO content. These particular characteristics would render necessary considerable alteration in consumers' appliances from what had existed to suit high-grade gas. Consequently these drawbacks and the statutory obligations to supply gas of a certain illuminating value have been the root-cause of its limited use.

The manufacture of water gas has many distinct advantages in its adoption—such as the smaller ground space required, and its adaptability to meet sudden demands. These appeared to be so weighty in its favour that universal adoption was expected. During later years the introduction of a falling calorific value of the gas supplied by gas authorities has enabled water gas to find a better place. The general practice has been to make a high-grade coal gas and dilute to a desired standard with water gas or else supplement the coal gas with carburetted water gas. War conditions, however, have created water gas plants differing from the orthodox, inasmuch as it has become a general practice to inject steam at the bottom of the charge in vertical retorts and in a lesser degree into horizontal retorts, so as to bring about a higher yield of gas per ton of coal. These all tend towards a process for the complete gasification of coal.

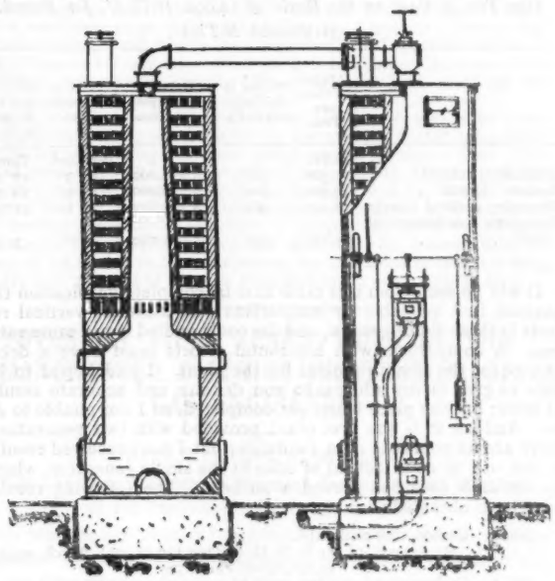
In the report of Sir Dugald Clerk, Prof. Smithells, and Prof. Cobb, to the President of the Institution of Gas Engineers, on the "Coal Gas and Electrical Supply Industries of the United Kingdom," they suggest that 75 to 80 p.ct. thermal efficiency might be obtained from the complete gasification of coal in vertical retorts, in which the water gas process and the carbonization of coal should be completed in the same apparatus and the retorts be heated regeneratively. This is what I had in view when deciding upon my scheme of extensions.

In the selection of a water-gas plant, I saw possibilities of achieving these results from Tully's carburetted hydrogen plant, and decided to adopt his system. I was aware that he had collaborated with the late Prof. Lewes, who had strong inclinations towards the lines upon which we are progressing to-day.

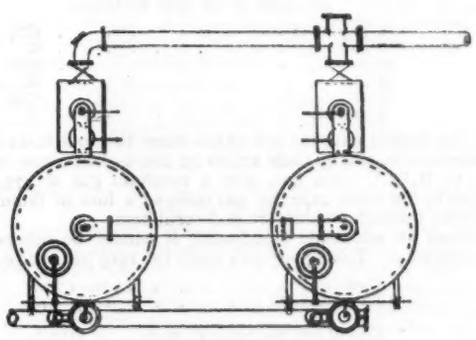
The plant now being installed at my works will be the first of its kind. It consists of two generators instead of one, so arranged that either one or the other can be worked separately or the two be worked together. The generator has been mentioned several times in the Technical Press. It consists of a steel shell, 6 ft. by 18 ft.; the bottom 8 ft. being a water-gas generator and the top half containing a vertical gas retort surrounded by chequer brickwork so as to form a regenerator through which the waste gases pass and help to carbonize the coal in the retort. The plant will make blue gas, a mixture of coal gas and water gas, carburetted water gas, producer gas, or a mixture of producer gas and coal gas. It thus has a very wide range of usefulness.

It is my intention to attempt the complete gasification of coal; and for this purpose I intend the working of the generators to be as follows: When blowing, the blast gases pass up through the nostrils at the base of the vertical retort, meeting secondary air, and thence through the chequer work and out of the stack valve. When the necessary temperature has been obtained (which is evident by the appearance of a flame at the stack valve), the blast and stack valves are closed, and steam is admitted into the bottom of the generator, producing water gas at a temperature of well over 1000° C. This water gas passes through the coal charge in the vertical retort, distilling off the water vapours and hydrocarbons which pass over to the second generator, down through the vertical retort, at the base of which they meet a supply of superheated steam, and together pass through the incandescent fuel in the bottom of the generator, and are converted into permanent gas rich in methane.

After five minutes' steaming, the generators are blown to incandescence again, and steamed again in the reverse order; or one generator can be blown to incandescence while the other is being steamed on a down-run. As soon as hot, steam is admitted to the bottom, up through the coal in the retort, and down through the retort already being steamed. The idea is to crack the hydrocarbons, at the same time decomposing the steam; in order that the liberated carbon of the hydrocarbons will combine with the oxygen of the steam and produce carbon monoxide.



Elevation.



Plan.

TULLY'S PATENT GAS PLANT.

The diagram herewith shows the arrangement of the two generators. It is my intention to work the generators in such a way that a continuous supply of hot gas will flow from the plant direct into the foul main and mix with the coal gas there—keeping the temperature of the carburetted hydrogen well over that of the coal gas, so as to take up some of the light hydrocarbons.

The practice of using coal instead of coke in the generator is of very recent origin, and the selection of two generators for our plant suggested great possibilities. Any system which will accomplish this result demands our closest investigation, as it will reduce the coal requirements of the industry, relieve many of the anxieties of the gas engineer, and incidentally it would remove the necessity of carrying so large a stock of coal. It also increases the range of coals suitable for carbonization. A coal with a lower coking value than the bituminous coal in general use will be found to lend itself to this process with advantageous results; and, anticipating our needs, I have had tests made of several coals, and give the following analyses for comparison.

Class of Coal.	Volatile Matter.	Ash.	Coking Power.	Calorific Value per Lb. of Coal.
	P.Ct.	P.Ct.		
Screened house coal . . .	33·50	3·00	3	13,520 B.Th.U.
Screened steam coal . . .	25·00	8·50	2	13,000 ,,
Shale coal	35·00	5·00	2	12,960 ,,
Mixed gas and house nuts .	34·50	2·50	4	13,684 ,,
Washed gas nuts	31·00	1·50	4	13,684 ,,
Screened gas coal	36·00	8·00	2·5	13,340 ,,
Bastard cannel	33·50	13 00	*Nil*	11,880 ,,
50 p.ct. cannel, 50 p.ct. screened steam coal . . .	32·50	8 50	1	12,420 ,,
50 p.ct. cannel, 50 p.ct. vertical retort coke	18·00	9·00	*Nil*	13,340 ,,

The coking power was determined by the following method: Mix a known quantity of coal with a known quantity of sand until a non-coherent coke is produced. The proportion of sand required then offers a comparison with other coals for classification as to its coking power.

The following table is a somewhat striking one, having regard to the heat units obtained as gaseous fuel from one ton of coal carbonized:

One Ton of Coal on the Basis of 14,000 *B.Th.U. per Pound.*
= 31,360,000 *B.Th.U.*

—	Make of Gas per Ton.	Values in B.Th.U. per C.Ft.	B.Th.U. Multiple per Ton.	Yield of Gaseous Fuel.	Coal Handled per 100 Million B.Th.U.
	C.Ft.			Per Cent.	Tons.
Horizontal retorts . .	11,500	500	5,750,000	18·3	17·3
Vertical retorts . . .	12,500	500	6,250,000	19 9	16·0
Steaming vertical retorts	18,411	462	8,505,882	27·1	11·7
Complete gasification of coal	55,750	450	25,087,500	80·0	3·9

It will be seen from this table that by complete gasification the gaseous fuel available by comparison with steaming vertical retorts is three times greater, and the coal handled is the same ratio less. A comparison with horizontal retorts must have a debit charge for the steam required for the plant. I had hoped to be able to give in my address to you definite and accurate results of tests; but the plant is not yet completed, so I am unable to do so. And as it is the first plant provided with two generators, there are no complete data available; but I have received results of the use of coal instead of coke in the single generator, which so far as it goes has proved a success. The following results have been obtained:

No. 1. Carbonizing coal only.
51,840 c.ft. of 381 B.Th.U. gas per ton of coal, which equals 19,751,040 B.Th.U. per ton.

No. 2. Carbonizing two-thirds washed nuts and one-third coke.
55,000 c.ft. of 396 B.Th.U. gas per ton of coal, which equals 21,780,000 B.Th.U. per ton.

Analysis of the Gas Obtained.

4·70 p.ct. of	CO_2
0·30 ,, ...	O
42·70 ,, ...	CO
37·56 ,, ...	H_2
13·04 ,, ...	CH_4
1·70 ,, ...	N

In the former case the hot gases enter the foul main at a high temperature, and by their action on the hydrocarbon vapours in a 450 B.Th.U. coal gas, give a resultant gas of 475 B.Th.U.; while in the latter case the gas suffered a loss of illuminants by passing through condensers and scrubbers.

From an economic standpoint, it cannot be otherwise than satisfactory. Taking our own costs for 1919 per 1000 c.ft. made:

Coal	2s. 1·12d.
Less residuals	1s. 1·92d.
Cost of coal per 1000 c.ft. made	11·20d.

Complete gasification on a basis of 80 p.ct. efficiency.

Coal—same basis as above.	
Gas made 55,750 c.ft. per ton. . .	6·10d.
Net gain on coal per 1000 c.ft. made.	5·10d.

No credit is taken for the yield of ammonia from the new plant; neither is any charge made for the steam. There will be a great saving in labour costs, also in repairs, and I am unable to find a single instance where costs are in favour of the present system, save perhaps steam, but it is doubtful whether even as much will be required as for working the existing vertical plant.

The advantages, therefore, are obvious. I consider that the results already obtained are very encouraging; and with a plant such as is being installed to accomplish complete gasification, I have no doubt that much better results can be obtained.

I very much regret that I cannot deal with this important matter by submitting definite data; but this meeting has come a little too soon for me to do this. Yet I consider the matter worth bringing to the notice of the members in view of the necessity of meeting the increased demand for gas; and as soon as I have information available, it will be at the service of members.

With this question I will close my address, as I am afraid I may have wearied you. Before sitting down, I wish to thank you for the great honour you have done me in electing me your President during this memorable year. I could not help but feel that the Council would have been justified in recommending to the members one who would have presided over the proceedings better than I can hope to do. However, I trust to have your indulgence for any shortcomings; and I feel sure I shall have your hearty co-operation in promoting the interests of the Institution.

Mr. T. B. BALL (Rochdale), proposing a vote of thanks to Mr. Hudson for his address, said he had covered a very wide field, and had called their attention to many subjects which they had attempted to deal with in the past, and to many more which some of them would have to deal with in the future. They would look forward to learning the results of Mr. Hudson's experiment with the hydrogen plant which he was installing for the complete combustion of coal. With the fears expressed at the end of the address they had no sympathy; for they felt the office of President would lose nothing of its dignity, importance, or usefulness at his hands. They looked forward with confidence to his year of office.

The vote was seconded by Mr. MOTTRAM, and carried with acclamation.

LUNCHEON.

This concluded the business; and the members then proceeded to an adjoining room, where the Jubilee of the Institution was enthusiastically celebrated with luncheon, toast, and song. Here a thoroughly enjoyable time was spent; the various items on the programme being excellently rendered. The chair was occupied by Mr. Hudson.

After the PRESIDENT had proposed "His Majesty the King as Duke of Lancaster,"

Sir DUGALD CLERK submitted "The Manchester District Institution of Gas Engineers." He remarked that it was perhaps a little inappropriate that he should now give them this toast, as he came among them that morning as an outsider, and during the business meeting they were good enough to elect him as an honorary member. The consequence was that he found himself in the awkward position of proposing a toast to himself as well as to others. They must, however, take him for the moment as a stranger. He had read through the highly interesting booklet on the fifty years' work of the Institution, and had admired what they had been doing. He had also glanced through the list of Past-Presidents, and the first one of them he really knew was the great Manchester gas engineer, Mr. Thomas Newbigging—a very able and very delightful man. There was a great deal to admire in the work of the Provincial Associations—they were so much alive. In London, people were apt to get a little crystallized; whereas in the Provinces they kept awake, and were more open in their discussions and said exactly what they meant. In connection with some of the big organizations in London, there was a tendency for the men who occupied the seats on the different councils to become too old. He was pleased to find that the members of their Council were real young men. It was, in his opinion, a mistake to keep members on a Council too long; they should pass the presidential chair before they became too old. To his mind, a man of (say) seventy years of age was too old for a president. He himself had retired from the Council of the Institution of Civil Engineers, as he felt they should get a younger man in his place. They should be changed more frequently. In the Provincial Associations, this trouble seemed to be avoided. It had been a very great pleasure to him to be with them that day.

The PRESIDENT, responding, said there was one suggestion made by Sir Dugald Clerk which he wished to give him back again—that was, to get rid of the old men. They did not want to get rid of such men as Sir Dugald Clerk. On the contrary, they hoped he might remain for many years to come to champion the cause of their industry. He was one of the greatest men, if not the greatest, that they could hope to have to defend them from the attacks of those who put before the public misrepresentations. Of late he had thrown out a direct challenge to the electrical profession, which apparently had not yet been accepted—no doubt for the good reason that they were afraid of a man of Sir Dugald Clerk's stamina. He hoped, therefore, in speaking of the old men being put aside, he was not really in earnest. Brilliant intellects were too valuable for the country to lose at the present time. Now that Sir Dugald Clerk was a member of their Institution, they might perhaps at a future date extract some contribution from him.

Mr. SAMUEL TAGG (Preston) proposed "The Visitors," coupling with the toast the names of Sir Dugald Clerk and Alderman Kay. He had, he said, always regarded it as a happy circumstance that gas engineers were at all times willing to meet and assist each other in the exchange of counsel and experiences. During the last five years, the occasions on which they had had to meet for collective consideration of questions had been numerous; and the problems to be solved had been grave. Whether they were yet at the end of their troubles he did not know; but he was quite sure that the success which had so far attended their efforts had been due to the existence of unity. They had seen the result of this in the formation of the National Gas Council, which he believed was destined to play a very useful part in the future of the industry. As far as individual members of the profession were concerned, he thought they all appreciated the opportunities of meeting together and exchanging views. The industry was indebted to Sir Dugald Clerk for the great interest in it which he had at all times displayed. This debt had been further increased by his acceptance of the position of President of the Institution of Gas Engineers. They were equally fortunate in their association with Alderman Kay, the Chairman of the Manchester Corporation Gas Committee, who had filled with great distinction the position of Lord Mayor of his city. During that time, as at all others, his counsel, his influence, and the facilities of the large department which he controlled, were placed at the disposal of the industry, which he took every opportunity of assisting.

Alderman KAY first of all expressed his appreciation of the kindness

shown in inviting him to the luncheon, and then went on to say how much he admired the good work the Institution were doing, and the close and hearty way in which the members co-operated one with another to forward the interests of what he considered to be one of the most important industries in the country. Upon their activities and co-ordination of effort and thought, the future prosperity of the country very largely depended. He had had a unique opportunity of seeing both sides of the question, because it was within the knowledge of many of them that, for nearly nine years, he was Deputy-Chairman of the Manchester Corporation Electricity Committee—in the difficult days when the department provided plant, and then had to set about providing the necessary load to keep it off the rates. Thus he knew the problem that faced the younger industry. It was only by the freest exchange of opinions, and an advancement on their past progress, that they could hope to keep pace with their younger brother. There was no question at all about this. He had had occasion to recognize and feel the disadvantage of being too careful about capital expenditure; and he wished to impress upon them the necessity of being up to the times, and of not hesitating to spend money if by so doing they could save money. No city had suffered more than Manchester by the fact that they had been loth to embark upon capital expenditure. This was a policy that could be carried so far that one could find oneself, as Manchester had done, dropping sadly behind. He was willing to admit that at one time he had not a very great appreciation of the gas profession; but since then he had been changing his opinion. In former days it was difficult to find among them men of imagination; and without imagination it was not possible to get very far. What was needed was imagination, ability, and strength enough to carry one's ideas through. With imagination and sound practice, one could get anywhere; whereas without these qualities one fell into a rut. The gas profession were in a rut too long, and had needed electricity to jog them out. Now they were out, they must make up their minds to keep out. As a public man, he felt that the country would get by such Institutions as theirs better men for this wonderful industry in which they were interested. Occupying, as he did, the position of Chairman of a big undertaking, he wanted the very best men when he asked for them. Place the figure high enough, and get the right man—that was his idea, and it was what he was going to act upon. He would urge them to remember that, however high they mounted the ladder, there were always a few steps beyond; and therefore they should never leave off trying to get a little farther than others had succeeded in doing. By these means, the industry would continue to progress in the manner in which it ought to do having regard to the importance of its success to the country and to the Empire at large.

Sir DUGALD CLERK said he had listened to Alderman Kay with the greatest interest; for he had been giving the members a great deal of good advice. It seemed to him that perhaps they had been getting a little too much advice lately. He thought gas engineers compared favourably with electrical engineers, or with anybody else. In the gas industry he had found men of the highest possible scientific ability and of the greatest flexibility.

The PRESIDENT said they would all be very pleased to know that they had with them one of the founders of the Institution; and he was going to ask him to give the next toast.

Mr. JOHN BOOTH, of Southport, in proposing "Past Presidents," remarked that he was the last survivor among those who originally formed the Institution; and he thought he could say, without any doubt whatever, that the Institution had proved its value many times over. Fifty years was a long time to look back, but he had vivid recollections of the conception of the Institution. In the latter part of the sixties, their late friend and highly esteemed fellow-worker, Mr. Thomas Newbigging, had secured an appointment in South America—he believed it was at Pernambuco—and a few of the gas managers of the district (they were not known as gas engineers in those days, but simply as gas managers, because in the majority of cases they were consulting engineers) felt that he ought not to leave the country without receiving the best wishes of his friends in the immediate neighbourhood. Therefore a small dinner party was arranged at the Mitre Hotel in Manchester; and during the evening a suggestion came from Mr. Newbigging that there ought to be a combination of the gas managers, and that they should form an Association. Some time after that, this suggestion of Mr. Newbigging's was taken up. Mr. W. Longworth was appointed Secretary; and as the result of the small beginnings of those days, they had now a strong and healthy Institution. There had been a succession of Presidents, all honourable and worthy; and he gave them the toast of these Past Presidents, coupled with the name of Mr. T. Banbury Ball.

Mr. T. B. BALL (Rochdale) remarked that he had been a Past-President for upwards of thirty years. It would be admitted that the Past-Presidents included men of exceptional ability, who had guided the Institution in the past with great wisdom and foresight. The last five years had perhaps been as strenuous and as difficult as any that had preceded them; and he thought they had a right to challenge criticism of the way in which they had passed through these strenuous times. ["Hear, hear."] Some of those who remained would no doubt have preferred to lay down the burden after so many years; but they could not all do so. So they did their best in the positions they still retained, and lent such assistance as they could to the younger brethren who were coming forward to take their places. They tried to make the undertakings for which they were responsible assimilate the progress which was taking place, and to give such advice to those who were their employers as would tend to make the industry to come triumphantly through its ordeal. Speaking with a full sense of the difficulties and dangers which beset them, he would say that those who were fortunate enough to live for but a few years longer would see the gas industry in a far better position, and better able to meet competition, than it had been in the past.

Mr. J. P. LEATHER (Burnley), in submitting the toast of "The Press," said they were there to celebrate fifty years of usefulness of the Institution; and in doing so they naturally looked back a little bit into the past. Looking backward brought to mind what was sometimes known as the Parent Institution, which was a direct lineal descendant from the Gas Institute and the British Association of Gas Managers, which was also, he believed, founded in Manchester some sixty years ago. But the institution he had to speak about was an older institution even than this. He found in the number of the "GAS JOURNAL" [the "JOURNAL OF GAS LIGHTING" it then was] for August, 1849, that a very prominent place was given to an announcement that measures were then in progress for the formation of an Institution of Gas Engineers. Further details of the project were promised to be given in the following issue; but he did not find them. However, in the "JOURNAL" they had an old institution which had worked on the same lines as the Institution they had been speaking of that day. Mention had been made regarding the benefit of communication between gas engineers of their experiences and practice and theories. But it was not always so. There was a time when certain of the London engineers were so uncommunicative that it was difficult to get into their works and see what they were doing. Probably it was really jealousy that prevented the Institution of Gas Engineers coming into existence in 1849, and left it to the North-country people to make a start. But it was evident that the "JOURNAL" was in favour of an Institution being formed much earlier. He did not know how far the Technical Press went back; but there was at one time a "Gas Gazette," and the "JOURNAL" had continued in one form or another from Feb. 10, 1849, to the present time. The first volume was a two-yearly one; and now they had four volumes a year. In December, 1859, there was an article in the "JOURNAL OF GAS LIGHTING," in which that paper claimed to be the parent—first of all of the "Journal de l'Eclairage au Gaz," then of the "Gas and Water Times" (which after a time came to an end), next of "Le Gaz," and the "Journal für Gasbeleuchtung," and finally the "American Gas Light Journal."

The PRESIDENT said there were present his Acting Chairman (Mr. Lawrence), and another Director (Mr. Wright), and he would ask the former gentleman to say a few words.

Mr. G. M. LAWRENCE (Normanton) said he was pleased to be there to support their esteemed manager on his election to the honourable position for which they had been good enough to select him. The best of good feeling had always existed between Mr. Hudson and his Directors; and he possessed the entire confidence of the Board. Any proposal that Mr. Hudson put before them was assured of sympathetic consideration; and with the results of suggestions of his which they had adopted they had been very well satisfied. He trusted that, by reason of legislation or by other means, the gas industry would during Mr. Hudson's period of office as President again come into its own.

NOTES ON FIFTY YEARS' WORK OF THE MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

By H. KENDRICK, of Stretford.

[Extracts from a Brochure Prepared for the Jubilee Meeting of the Institution, Thursday, Feb. 26.]

The Manchester District Institution of Gas Engineers owes its formation to a meeting of gas engineers who desired to honour the late Mr. Thomas Newbigging, D.Sc., on his leaving England for Pernambuco, Brazil. A presentation was made to him at the Mitre Hotel, Manchester, on Feb. 26, 1870. After the formal proceedings, it was suggested that it would be an excellent thing to hold periodical meetings. A Committee was at once formed, and the first general meeting was held on March 26, 1870.

The first Officers and Committee were:

President: Joseph Wood, of Bury.
Hon. Treasurer: Harrison Veevers, of Bolton.
Hon. Secretary: William Longworth, of Dukinfield.
Committee: James Jacques, I. Kelsall, James Paterson, J. Burgess, James Braddock, William Smith.

Mr. Wood held office for two years—a distinction only conferred on the late Mr. J. G. Newbigging under the stress of war conditions. Among those present was Mr. John Booth, of Southport, who is the only member surviving at this date. Messrs. John and Walter Hutchinson, George Smedley, William Miles, David Clarke, H. Lyon, and Charles Craven joined in 1870. Mr. Thomas Newbigging, who was Hon. Treasurer to the Institution for thirty-one years, did not become a member until after his return to this country in 1875.

The name of the Institution was originally the Manchester and District Association of Gas Engineers, but was changed to its present title in September, 1877. The credit for the successful launching of the Institution is largely due to Mr. Longworth, the first Secretary, and to his indefatigable spirit and enthusiasm. This was recognized in October, 1877, when the members made him a presentation in acknowledgment of his services. A long line of capable Secretaries followed; and their services have generally been suitably acknowledged.

In 1902, the original rules were found inadequate to meet the needs of the growing Institution, and were redrafted and adopted. This increased the number of elected members of the Committee from six to nine, and introduced the balloting-list for the original open voting. These rules were further amended in 1905, to allow of the admission of associate members; in 1908 for the inclusion as members of general managers of gas undertakings of over 600 millions per annum; and once again in 1916 for the admission of honorary members. These alterations extended the scope of the Institution's work to include all departments of gas manufacture and distribution, and have added much to its usefulness.

Many other honoured names have figured on the membership roll, and have since passed away:—viz., Joseph Hepworth,

W. R. Chester, James Paterson, T. O. Paterson, G. E. Stevenson, Edward Allen, Thomas Bower, J. G. Newbigging, &c.; while among those with us to-day, but no longer members of the Institution, are John West, C. E. Jones, Henry Woodall, W. R. Herring, Thomas Duxbury, Samuel Hunter, &c.

Next to Mr. John Booth, the oldest surviving members are: James Riley (1878), T. Banbury Ball (1882), W. S. Haddock (1885), and Charles Wood (1886), all of whom have done yeoman service in furthering the interests of the Institution.

The Institution is the senior of the English District Associations. It has 210 members, all of whom are actively engaged in the management of gas-works, except a few who have retired into private life. It has had a vigorous existence; and many of the kindred associations found their sponsors and supporters among its members. The first Junior Gas Association was founded in Manchester in 1898. In 1903 the Yorkshire Juniors founded an equally successful Association; and both received the backing of many influential members of the Institution. In 1908 they were affiliated to the Institution by the appointment on their Councils of representatives of the Committee and of the President for the time being of the Junior Associations on the Committee of the Institution—an arrangement that has been beneficial to all.

The movement known as the Commercial Sections, to which the gas industry owes so much, had its birth here also. Some years prior to its affiliation to the Institution in 1903, Mr. S. Meunier, of Stockport, had called a meeting of local gas engineers in Manchester, and the work was begun privately which has led to such beneficial results. There are now no less than six Junior Associations and eleven Commercial Sections in active operation in the United Kingdom—the latter a monument to the foresight of Mr. Meunier and his associates.

Members of the Institution have been prominent in every sphere of action connected with the industry. The preliminary work prior to the formation of the British Commercial Gas Association (suggested by the Southern Association) was enthusiastically supported by your Committee and the Commercial Sections; and the first public report on the subject was signed by two members, S. Meunier and H. Kendrick, as Chairman and Hon. Secretary respectively of the Sub-Committee representing all District Sections. At Manchester after the scheme had been launched by the indefatigable efforts of Mr. Goodenough and his Committee, the support of the municipal undertakings was secured—which led to its phenomenal success—largely through the efforts of Alderman F. S. Phillips, of Salford, and Alderman William Kay, of Manchester.

The Institution has been prominent in education matters. The addition to the City and Guilds of London Institute syllabus of the "Distribution" and "Gas Fitting" courses was entirely due to the original proposals of Messrs. J. H. Brearley, H. Kendrick, and E. H. Hudson; while among the list of Examiners have appeared the following members' names: Samuel Glover, J. H. Brearley, Walter Hole, and H. Kendrick.

Members have also figured prominently in the work of the Institution of Gas Engineers. Among the many prominent names whose work has had lasting effects on the industry are: Edward Allen, John Bond, Charles Wood, W. R. Chester, J. H. Brearley, John West, Charles Eastwood, Henry Green, C. E. Jones, James Paterson, Thomas Newbigging, &c.

Mr. Brearley's work led to the modern gas-fire being put on the market. Mr. J. P. Leather is taking a prominent part in the perfecting of "Refractory Materials," and Mr. Samuel Glover (backed by our representatives) was instrumental in placing the claims of gas as the most economical method of "conserving coal" before the Government and the British public.

The following past and present members have served as Presidents of the Institution of Gas Engineers and its predecessors: James Paterson, T. O. Paterson, Thomas Newbigging, Joseph Hepworth, W. R. Chester, G. E. Stevenson, Charles Wood, R. G. Shadbolt, John Bond, Edward Allen, and Samuel Glover; while no less than 39 members have contributed to its proceedings, including Thomas Newbigging and his sons, W. and J. G. Newbigging, James and T. O. Paterson, J. and W. Chew, William Carr, W. R. Chester, Harrison Veevers, J. H. Brearley, Henry Woodall, John West, C. Eastwood, Henry Green, J. R. Frith, Edward Allen, C. E. Jones, G. E. Stevenson, R. Watson, and others.

The National Gas Council has found many strenuous supporters among the administrators and engineers of gas undertakings within the territory of the Institution, among whom figure prominently Alderman F. S. Phillips, of Salford, Alderman William Kay, of Manchester, and Mr. S. Tagg, of Preston.

Technical fare has never been wanting at the quarterly meetings, either in the form of papers on subjects of interest to the profession or in visits to works—every facility being given to members by Directors and Committees and their responsible officials for inspection; and much valuable information has been placed at their disposal. The papers read and discussed have always been of great interest; and the industry has derived immense benefits from the published proceedings. The subjects have ranged over every department of gas-works administration, construction, and manufacture.

In 1910 a Joint Committee of the Institution and the Manchester Junior Gas Association arranged with the Manchester University Senate and Prof. Harold B. Dixon, and inaugurated a highly successful series of lectures on Gas Engineering, Manufacture, Distribution, Appliances, and Scientific Subjects related to the Industry. These ran through four winter seasons, and had to be abandoned at the outbreak of the great war. A considerable proportion of the expenses of these lectures was defrayed from the Institution funds.

In August, 1884, a resolution was passed at a general meeting, approving the formation of a reference library for publications in connection with the industry; but the project apparently fell through, as no further reference to it appears in the minutes.

In 1917, the Institution took part in bringing the claims of the chemical and engineering industries before the Manchester Libraries Committee for the establishment of a Municipal Technical Library, in the projected new library building; and in the Parliamentary Session of 1920, the Manchester Corporation introduced a Bill, containing clauses that will enable something to be done in the matter, the project might very well be revived as a Jubilee Memorial of the Institution.

The Institution has supported all exhibitions, however remotely connected with the gas industry; and in 1882 one of its meetings was held during the run of a Smoke Abatement Exhibition at Campfield, Manchester, when a lecture, which was open to the public, was delivered by Mr. John West on "Burners, &c."

The great war seriously affected the members; and the death of at least one prominent member (Mr. Edward Allen) can be attributed to the strain of additional and arduous duties undertaken willingly and ungrudgingly by all. Among many others who gave of their limited time and experience were our members John Bond and Samuel Glover—the former serving in connection with toluol extraction and the latter in coal supplies. The call to supply the hydrocarbons, benzol, toluol, &c., was answered with practical unanimity; and the area represented by the Institution provided its full quota to Lord Moulton and the Explosives Department of the Ministry of Munitions.

The withdrawal of so vast a number of men from industry crippled the gas-works controlled by the members to so unparalleled an extent that it was found necessary to certify the majority as necessary for the production of munitions. This relieved the situation somewhat; but the difficulties of obtaining the necessary labour, coal, and other materials increased as the war progressed. But despite all these drawbacks, all but a very few works continued to meet all demands and successfully carried through to the end.

Presentation to Mr. Harold H. Collett.

Prior to the departure of Mr. Harold H. Collett from Leeds to take up his appointment as Chief Engineer of the Danish Gas Company, the officials and workpeople of the Meadow Lane Gas-Works on Monday last presented Mr. and Mrs. Collett with tokens of their goodwill. These took the form of a kit bag for Mr. Collett, and a gold wrist watch for Mrs. Collett, together with a framed list of contributors. Mr. C. S. Shapley, the Engineer and General Manager of the Gas Department, presided; and the gifts were handed over by Mr. John Bradbury (foreman joiner), who spoke of the cordial relations which had always existed between Mr. Collett and the workpeople, and wished him and his wife and family success and happiness in their new surroundings. In response, Mr. Collett thanked the donors, on behalf of himself and his wife, for their handsome gifts. He also expressed his gratitude for the support which he had always received from the staff and workpeople at Meadow Lane, and his high appreciation of the kindness, help, and courtesy which Mr. Shapley had invariably shown towards him.

Coal-Tar Chemicals in the United States.

In a report of the United States Tariff Commission for 1918, on dyes and coal-tar chemicals, it is remarked that coke manufacturers are interested primarily in the quality of their coke for making pig iron, whereas the gas company are concerned principally with the illuminating and calorific value and yield of the gas. These divergent requirements have resulted in the development of different designs of apparatus for the two purposes, which give tars of somewhat different quality. An important difference is in the amount of insoluble matter, or free carbon, which is present in amounts not exceeding 25 p.ct. in the tar from coal-gas plants, and 10 p.ct. in the tar from coke-ovens. Another difference is that coal-gas tar contains important amounts of tar acids (phenol and cresol); while in tar from coke-ovens there are relatively small amounts of these important substances. At least 125 different chemical substances have been isolated from coal tar; and the following are at present of commercial importance: Benzol, toluol, xylol, cumol, naphthalene, methylnaphthalene, anthracene, methylanthracene, carbon bisulphide, phenanthrene, carbazol, phenol, cresols, xylenols, pyridin, quinolin, and free carbon. Complex mixtures made from coal tar by fractional distillation appear in commerce under the names solvent naphtha, light oil, creosote oil, anthracene oil, and pitch of various grades. These pure substances may be obtained from coal tar by processes involving chiefly fractional distillation or sublimation, and washing with acids and alkalies. The more or less purified substances obtained in this way, and known commercially as the coal tar crudes, are the raw material from which all the other products are derived. The recovery of these purified substances from coal tar, commercially, has been backward in the United States, as compared with its development in Germany and England. Benzol, toluol, and naphthalene were recovered to some extent prior to 1914.

GAS BOOSTING.

By D. BALFOUR BAIN, A.M.I.M.E.

[A Paper read before the London and Southern District Junior Gas Association on Friday, Feb. 27.]

As the term implies, gas boosting refers to the raising of gas pressure by any means and for any purpose. Where the pressure increase amounts to only a few inches water column (say, up to 30 in.), centrifugal fan-type boosters are usually employed. The characteristics of the type of machine are such as to make it particularly suitable for the purpose. For higher pressures than 30 in., rotary compressors or reciprocating piston-type machines are generally used, although multi-stage centrifugal boosters may be used with advantage up to quite high pressures, where a reasonably large volume of gas has to be dealt with, and where direct coupling to high-speed electric motors or steam-turbines can be resorted to.

The purposes to which gas boosters have been applied are almost innumerable; but the object in view is always the same—namely, to increase the flow of gas by raising its pressure or head. Probably the most common application is for raising the pressure in a town's gas-main so as to augment the supply of gas to residents for cooking, heating, and lighting purposes; and since in nearly every case the potential or pressure energy in the gas is made use of for injecting and mixing a sufficient quantity of air for combustion, the gas pressure available is of great importance, especially in the case of incandescent lighting burners, where it is well known that the efficiency and light intensity are very much improved by increasing the gas pressure, and thereby increasing the air content in the combustible mixture.

In many districts the demand for gas has outgrown the supply available at normal pressure; and it becomes necessary either to lay larger mains—always an expensive business—or to increase the initial pressure so as to force more volume through the existing pipes; in other words, to allow for the additional friction loss caused by the increased velocity of flow.

If the simplest case be taken, of a straight level pipe of uniform bore (say) 12 in. bore and three miles long—and suppose no gas is drawn off *en route*, so that the velocity will be uniform throughout its length—when no gas flows, there will be no velocity. Consequently, there is no friction loss or loss in pressure along its length, and the pressure will be the same at all points. But the moment gas is allowed to escape at the far end, the pressure will begin to fall at that point due to friction loss all along the pipe; and as the velocity will be uniform, the fall in pressure per unit length will be uniform. That is, the pressure gradient will be a straight inclined line falling towards the delivery end, and the steepness of the gradient will be nearly proportional to the square of the velocity. Thus if one can find (by experiment or calculation) what the loss in pressure amounts to over the length of pipe when passing a known volume, an estimate can be made of what the loss will be when passing any greater or less volume to within practical limits.

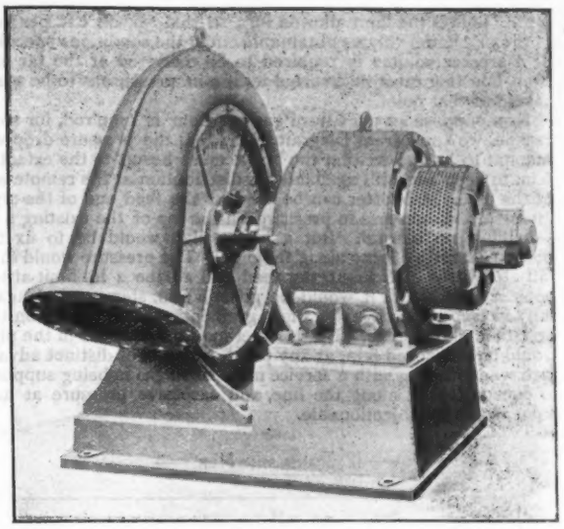
If a uniform volume of (say) 15,000 c.ft. of gas be passed per hour, having a relative density of ·5, the drop in pressure from one end to the other will probably be in the neighbourhood of 1·5 in. water column. This can be calculated by any reliable formula; and for the above conditions Dr. Pole's well-known formula will be found to give fairly reliable results. It can be worked out on any ordinary slide-rule, although much time and labour may be saved by using a slide-rule specially constructed for the purpose.

The actual fall in pressure along a pipe-line is usually very difficult to arrive at by calculation, with any degree of accuracy, owing to the irregularities encountered. It is easy to arrive at a fairly near approximation of what the friction loss would be in a straight level pipe of uniform bore with a smooth unbroken inner surface, provided one knows the bore and length of pipe, the nature of the inner surface, also the density and viscosity of the gas, and its velocity. But in actual practice the pipe bore is only approximately uniform—joints occur at short intervals, and bends, elbows, and tees have to be introduced, as well as valves and other apparatus. All these offer a certain resistance to flow, almost impossible to calculate; so that a few actual test figures taken under known conditions are of the greatest value. If, however, these cannot be obtained, a percentage must be added to the calculated loss so as to cover the irregularities—say, 50 to 100 p.ct., according to circumstances.

Another factor to be taken into consideration is the difference in elevation between points in the main—the pressure being greater the higher the elevation, to the extent of about 1 in. water column for every 130 ft. vertical height, with gas at half atmospheric density.

Now having found the probable pressure loss when passing 15,000 c.ft. of gas per hour, a diagram can be prepared showing the pressure gradient for this volume; and from a simple calculation it is quite possible to draw the gradient for any greater or less volume. For instance, when passing say 30,000 c.ft. of gas per hour, the friction loss in the same pipe would be approximately $\frac{(30{,}000)^2}{(15{,}000)} \times 1{\cdot}5$ in. = 6 in. loss; and for 42,500 c.ft. per hour $\frac{(42{,}500)^2}{15{,}000} \times 1{\cdot}5$ in. = 12 in. loss.

If a curve is first constructed showing the total drop in pressure against volume, it is seen at a glance what the volume will be with any pressure loss; and from this the pressure gradient can be drawn to show what the pressure will be at any point along the pipe.



Electric-Motor Driven Booster.

Diagram No. 1 shows the relation between volume passing and total loss in pressure over the whole length of pipe.

Now suppose there is a pressure at the inlet end of the pipe of (say) 8 in., and that the pressure must not fall below (say) 2 in. at the far end, in any circumstances, it is possible to draw a gradient chart showing the full capability of the pipe-line for transmitting

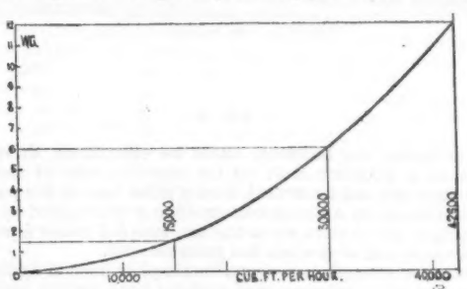
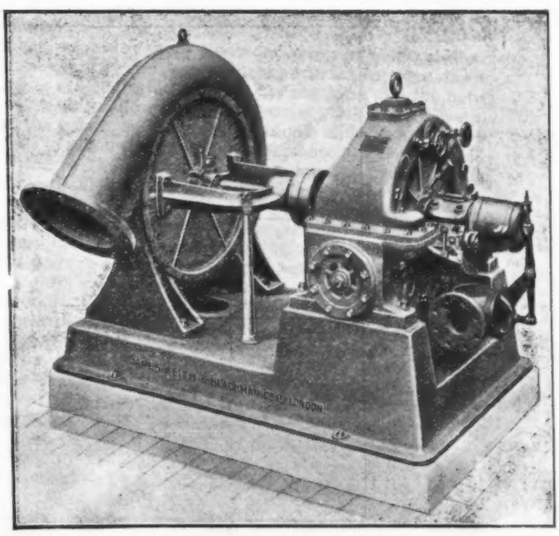


Fig. 1.

gas under all conditions of pressure, and so see at a glance when boosting must be resorted to, and the effect produced.

Diagram No. 2 shows all the above conditions very clearly. The base line represents atmospheric pressure, and to scale represents a three-mile length of a 12 in. diameter pipe—the flow being from left to right. When passing 15,000 c.ft. of gas per hour, the terminal pressure (as shown) will be 6·5 in. with 8 in. pressure at the supply end—1½ in. having been expended in overcoming the pipe friction. With 30,000 c.ft. of gas per hour flowing, the velocity will be doubled; so the friction loss will be 2^2 = four times 1½ in. = 6 in.—bringing the pressure at the far end down to



Steam-Turbine Driven Booster.

2 in. This is the limit allowed for; so that 30,000 c.ft. per hour is the maximum volume obtainable under the conditions specified. If a greater volume is required to be delivered at the far end, then boosting must be resorted to, if 2 in. pressure is to be maintained at that point.

Now suppose 42,500 c.ft. of gas per hour is required, for some reason, we know from Diagram No. 1 that the pressure drop will amount to 12 in.; so that the boost must be up to the extent of 6 in. to keep 2 in. still available for distribution at the remote end of the pipe. A booster can be fixed at the feed end of the pipe, giving a 6 in. increase in pressure on the top of the existing 8 in. —making 14 in. total. But a better plan would be to fix the booster about half-way along the pipe. The pressure would then fall steeply from 8 in. at the feed end to the 2 in. limit at the booster inlet, where it would be given a 6 in. step-up, and again fall towards the delivery end in a gradient parallel to that on the first half of the pipe. By this method, the pressure in the pipe would never exceed 8 in. at any point, which is of distinct advantage when dealing with a service main when gas is being supplied to consumers all along the line, and excessive pressure at any point would be objectionable.

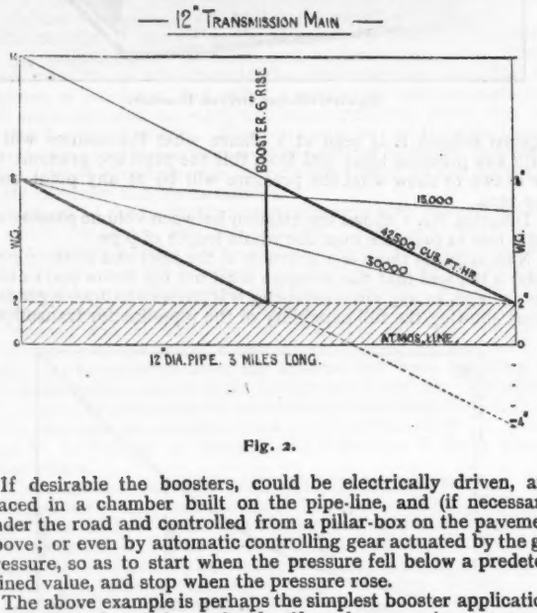


Fig. 2.

If desirable the boosters, could be electrically driven, and placed in a chamber built on the pipe-line, and (if necessary) under the road and controlled from a pillar-box on the pavement above; or even by automatic controlling gear actuated by the gas pressure, so as to start when the pressure fell below a predetermined value, and stop when the pressure rose.

The above example is perhaps the simplest booster application. In the case of a service main of uniform bore, serving consumers all along its length, the pressure gradient would take the form of a concave line—the pressure falling rapidly at first, and gradually becoming less steep as the volume, and consequently the velocity, decreased. To obtain the exact form of pressure curve, it would be necessary to take pressure readings at different points (simultaneously) when a known volume of gas was passing, or they could be taken from charts of pressure-recording instruments suitably placed.

Diagram No. 3 shows the pressure gradients under two working conditions on a distribution main of 12 in. uniform bore throughout and 3 miles long—a branch being fed at each half-mile, and assuming 2 in. pressure to be maintained at the far end, as before. The lower curve shows the pressure conditions when 30,000 c.ft. of gas per hour is being fed into the pipe, 5000 c.ft. per hour being drawn off at each branch, and 5000 c.ft. per hour delivered at the far end. The pressure at the feed end would require to be about 4 in. to cover the transmission losses and maintain 2 in. at the extreme end. If the volumes are doubled throughout, feeding in 60,000 c.ft. at the end, and drawing off 10,000 c.ft. at each branch and at the end, the initial pressure would need to be boosted-up to 10 in. The upper curve shows the pressure conditions at points along the service pipes.

Most gas-boosting problems are much more complicated than the above examples; but they show the methods by which the desired information can be obtained and recorded for further investigation when necessary.

It is generally advisable to force the gas through pipes by increasing the pressure, as in the case of inducing it to flow by lowering the pressure at one end, the gas will be expanded, and the greater volume to be handled will mean increased power expenditure; also there is risk of drawing in air or water, should any leak occur.

Boosters are frequently used for augmenting the gas supply to outlying districts, where the demand has exceeded the capacity of the main under normal pressure. In cases where it is intended to draw the gas from a distribution main, it is important to make sure that the increased flow of gas caused by the boosting will not seriously reduce the pressure in the main. This point can easily be investigated, as already explained, by drawing up a pressure gradient chart which will show all the conditions clearly; and if the existing distribution main will not allow of the maximum volume required being drawn off at times of greatest demand, a small holder erected at the outlying point can be filled by means of the booster when the demand is small, and so help the district supply at night when the demand goes up.

Another case in which boosters are often used is to deliver quantities of gas through long mains to distant storage holders during the period of small consumption, and force it back to congested districts when the demand rises—thus relieving the demand on the works, and allowing shorter hours of making, and also better distribution.

Gas boosters are frequently installed in gas-works to keep up the pressure behind the station governors, and compensate for any fall in pressure as the holders uncup. They are also employed to feed a heavy holder, and keep it cupped for serving mains at a steady pressure—the gas being drawn from light holders unable to throw sufficient pressure themselves. Recently, it has become common to boost-up the gas supply to individual factories, so as to increase the pressure for industrial purposes, or simply to augment the gas supply should the pressure in the main be insufficient to meet the demand. In the latter case, the pressure in the main will be further reduced owing to the increased volume passed; and neighbouring consumers will suffer thereby. In these cases the volume is usually so small that tiny centrifugal boosters suitable for the volume would require to be driven at excessive speeds so as to give the desired pressure. Rotary machines of the compressor type are usually employed, fitted with automatic relief-valves set to bye-pass the surplus gas when the desired pressure has been attained.

Any meters in the circuit should be suitably protected against damage due to back-flow from the pressure charged pipes when the compressor is shut-down, or by a vacuum being formed in the meter if the compressor is started with the gas-cock on the meter closed. Automatic apparatus can be obtained to give this protection; but it is always best to start-up with all the valves on the compressor closed, and then open the inlet valves first and the outlet valves last. When stopping, the delivery valves should be closed first; and then the inlet valves, before stopping the machine.

The centrifugal gas booster is simply a well proportioned cen-

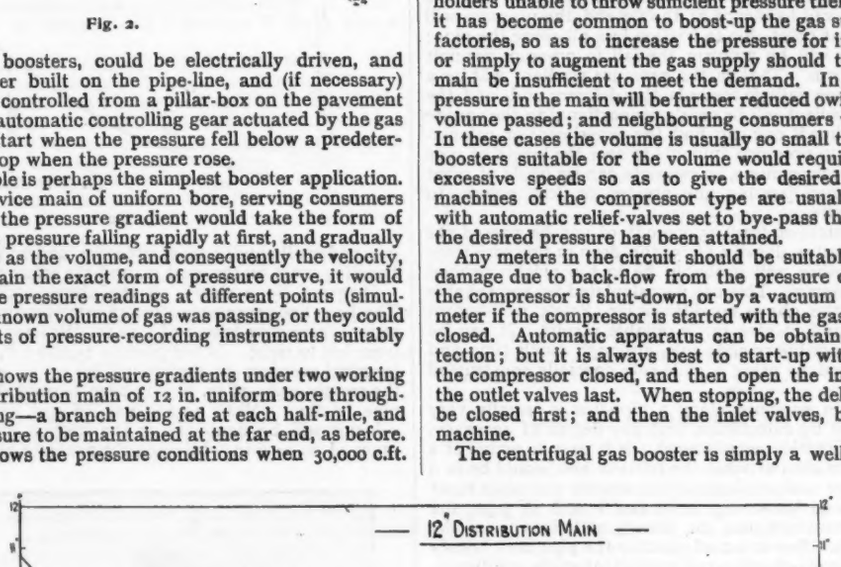


Fig. 3.

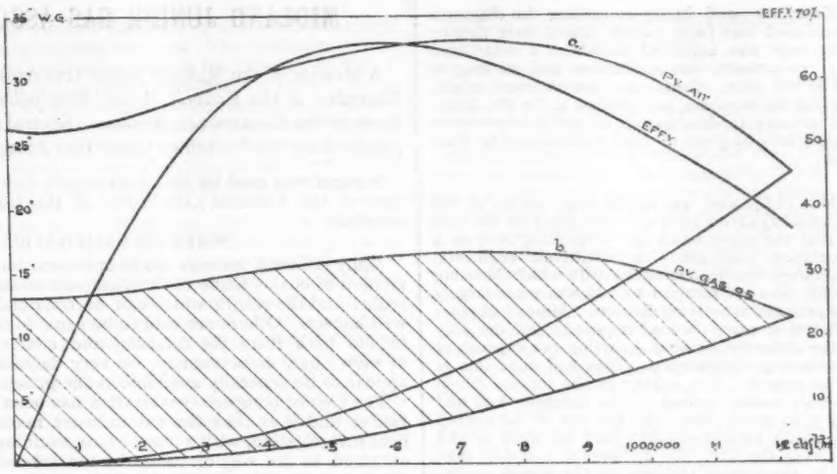


Fig. 4.

trifugal fan or blower, made gas-tight and designed to give, as far as possible, a constant pressure while passing a varying volume of gas. The impeller or fan-wheel runs free in the casing, and usually consists of a circular plate secured to a boss and keyed to the shaft. Mounted round the disc are a number of blades or vanes, generally covered by a shroud-ring. The gas entering axially through the centre of the shroud-ring, is carried round and leaves more or less tangentially from the periphery of the wheel.

The blades may be straight, fixed radially or sloping backward relative to the direction of rotation; or they may be curved either backward or forward. But the inner edge of the blade where the gas enters must slope forward so as to pick-up the gas without shock. Each form of blade will give a different pressure-volume characteristic. The backward leaning blades will give a quickly falling curve; the radial blades, one not so steep; and the forward curved blades, a nearly level topped curve, falling away as the volume approaches the maximum capacity of the machine.

The gas entering the wheel axially is guided by the conical wheel centre to the inlet edge of the blades, where it is scooped up and carried rapidly round with the wheel, and eventually thrown off the edge of the wheel into the scroll-shaped casing.

Theoretically, the total pressure should equal the density, or weight, per cubic foot of the gas, multiplied by the velocity squared, and divided by 32·2 the gravity acceleration constant. When not delivering gas, about half of this will appear as pressure in the gas, and part of the remainder as velocity; and if the velocity of the gas issuing from the wheel be slowed-down gradually in a well-designed diffuser in the casing, part of the velocity energy can be converted into pressure and added to the pressure produced in the impeller.

The characteristic of a well-designed gas booster is very similar to that of a shunt-wound dynamo. When driven at a constant speed, the pressure will be maintained nearly constant. From no volume or current, the pressure will begin to fall away; and beyond this point the pressure and efficiency of the machine will diminish rapidly.

If the machine is run short-circuited—that is, with the inlet and outlet connected—the machine will simply circulate a large volume of gas, produce little or no pressure, and put a very heavy load on the driving motor or engine.

The pressure produced, and the power absorbed, when driven at constant speed, and delivering a constant volume, will vary directly as the density of the gas. For instance, when handling gas having a density half that of the atmosphere, the pressure produced and the power absorbed will be half what it would be if handling air—assuming, of course, that the volume passed remained the same in both cases.

Diagram No. 4 shows the pressure volume characteristic of a centrifugal gas booster having a 14 in. diameter outlet. The upper curve (*a*) shows the pressure developed when handling air, and the lower one (*b*) when handling 0·5 density gas. The shaded part shows the actual static pressure available at the booster outlet. The lower curve forming the boundary of the shaded area shows the velocity head or pressure, equivalent to the velocity at the booster outlet. The efficiency between no volume and maximum volume is shown having a well-rounded peak, thereby giving a comparatively high efficiency over a wide range of volume. The maximum efficiency occurs at approximately half the maximum volume.

The horse power absorbed by a centrifugal booster working against moderate pressure may be taken as equal to the volume of gas delivered per hour multiplied by the total pressure increase in inches of water column, divided by 381,000 times the booster efficiency. So that to deliver 100,000 c.ft. of gas per hour against a total resistance of 1 in. would require theoretically 0·26 H.P.; and taking the booster efficiency at (say) 60 p.ct., about 0·44 B.H.P. would be absorbed. If a margin for bearing losses is allowed, a round figure of (say) half a horse power per 100,000 c.ft. per hour per 1 in. rise in pressure will be a safe figure.

The centrifugal gas booster offers a number of advantages over other types of machine when moderate pressure increase is desired. Its first cost is low; and having a relatively high efficiency, its running costs are also low. It takes up small floor-space; and a light foundation is all that is required. The rotative speed required being comparatively high, it lends itself to direct coupling to high-speed, and consequently cheap electric motor or steam-turbine.

The impeller running free in the casing without contact, no internal lubrication is required; and if ball or roller bearings are fitted, the only attention required is to feed it with a little grease about once a week—if the machine is in constant use.

Owing to the extreme simplicity of the machine, breakdown is most unlikely, and the efficiency is maintained throughout its life, being as high after years of service as when first installed.

There is always a clear gas-way through the booster, even while standing; so that, in the event of stoppage, the gas-flow is not interrupted, neither will the machine be injured in any way, should the inlet or outlet valve be closed-down while running.

Centrifugal gas boosters may be driven by belt from a gas or steam engine, or they may be direct-coupled to high-speed electric motors or steam turbines. When belt-driven, a light flexible belt should be used, and a fairly long drive arranged for. The belt should not be very tight. A good belt dressing will ensure a steady drive, without slip, loss of power, or excessive belt wear. It is advisable to keep the tight side of belt on the underside, so that the sag on the upper part may increase the arc of contact on the pulleys.

Direct coupling should be resorted to where possible, so as to avoid belt risks and troubles; and although the steam-turbine makes an ideal drive, the electric motor makes a very good second. Properly cared for, it should give little or no trouble, provided the motor and control gear are of sound design and construction.

The power absorbed by a centrifugal booster will be least when the machine is run with the valves closed; and when delivering gas, the power will vary approximately in proportion to the volume handled when run at constant speed.

When installing a centrifugal fan booster, it is important that the weight of all connecting pipes be supported, and independent of the machine itself; otherwise distortion may occur, putting the journals out of line, and causing running troubles.

As the rotating parts are carefully balanced, little or no vibration should be produced; so that a comparatively light foundation will be adequate, if the pipes are well supported. In some cases expansion joints are advisable between the machine and the connecting pipes, so as to allow for any movement due to expansion. As, however, the gas-pipes are usually placed underground, they are not subject to much variation in temperature. Valves should always be fitted to the inlet and outlet, in order to isolate the machine for overhaul and renewals; and where a booster is indispensable, a duplicate machine should, of course, be installed as a stand-by—each being run alternately for (say) a week at a time. Few spares need be kept, beyond a bearing of each side.

It is always desirable when installing a boosting plant, to fix an automatic bye-pass valve in the gas-main between the inlet and outlet connections, so that in the event of the booster valves being closed, the gas-flow will not be interrupted. Also when starting up the booster, this valve should close; so as to prevent short-circuiting of the machine.

A centrifugal booster cannot, in any circumstances, develop a greater pressure difference between the inlet and outlet than that corresponding to its speed; so that, unless it is run at a very high speed, there is no danger of damage to the holder crowns, governors, or meters.

Few precautions need be observed in operating the machine, other than keeping the bearings and glands well lubricated; but it is better to start-up with the valves closed, and close the valves before stopping.

The paper was read for Mr. Bain by Mr. A. J. Whyte, of the James

Keith and Blackman Company; and during its reading the diagrams and photographs reproduced here (with various others) were thrown on the screen. There were also exhibited models of a centrifugal booster and a rotary compressor, the mechanism and working of which were explained by Mr. Bain. Some questions on points arising out of the paper were put by members, and replied to by Mr. Bain; while Mr. Whyte said that any further matters on which information might be desired would gladly be given to those communicating their desire through the post.

Mr. F. J. Pearce (Mill Hill), who was in the chair, owing to the President (Mr. S. B. Chandler) having gone to Birmingham for the joint junior meeting, said that the paper was a very interesting one, on a subject of great importance, particularly to distribution engineers. There were few undertakings now in connection with which boosting in some form or another was not resorted to. It was most largely used for increasing the pressure to outlying districts. Mains laid years ago had become insufficient to carry the load required; and the only way of getting over the difficulty, without incurring the expense of a new main, was by increasing the pressure. They had done this at Mill Hill, with excellent results. The upkeep of the turbine-driven booster was a very small matter indeed. His company had had machines running for a good many years; and the cost of the upkeep was so minute as to be hardly noticed—though they ran week in and week out at various times of the day. On Sundays at mid-day, they boosted up to about 18 in. pressure at the inlet to the station governors. The pressure given by the fan was absolutely steady.

Mr. S. B. Chandler, in a note which Mr. Pearce read, said he much regretted his inability to be present to hear the paper by Mr. Bain, particularly as the subject was an important one, in view of its bearing upon the present conditions of gas supply—and more especially at this juncture, when great development might be expected on districts served by gas undertakings, due to increased demands for gas. In the housing and other schemes which now appear to be coming about, gas would play a big part. An essential factor in gas supply was adequate pressure at all times; and its absence gave rise to much dissatisfaction to consumers—leading, in some instances, to permanent loss of business. Boosting, though perhaps not a panacea for all troubles (on old mains "unaccounted for" would probably present a problem), would appear to overcome the disadvantages of small mains which were sufficient for existing requirements. In view of the prospective new demand, the attention of distributing engineers would have to be given to the question of the desirability or otherwise of replacing mains which might be ample for present demands. The information given by Mr. Bain would doubtless go some way towards making clear the possibilities of pressure-raising in certain cases, as against the large expense of relaying mains.

Mr. E. G. Stewart, proposing a hearty vote of thanks to Mr. Bain and Mr. Whyte, said he believed in Birmingham boosting fans had been put into operation on the gas-works. They allowed the exhausters merely to push the gas through the plant, without having to push the holders up at the end.

Mr. F. A. Frost seconded the vote; remarking that the subject dealt with in the paper was one which had engaged the attention of gas engineers for the last twenty years. They had been accustomed during the past winter to deliver quantities of gas unthought-of previously; and the problem of keeping up the pressure in the mains was very serious. In the case of the South Metropolitan Gas Company, with their existing mains and gasholders, it would without boosters be quite impossible to get on at all. It was very evident from the pictures of machines they had seen on the screen that the manufacturers were very much alive to the importance of this subject. They were scientific in design, and might be depended upon to give more efficient results than machines which were installed in the years gone by. It was not unreasonable to suppose that in future there would be an all-round increase of pressures in the district mains. They had been used in the past to having storage capacity equal to from 80 to 100 p.ct. of the 24-hours' make; but in many cases it had fallen now to 40 or 50 p.ct.

Mr. Bain and Mr. Whyte acknowledged the vote.

Congress of the Societe Technique du Gaz en France.

The current number of the "Journal des Usines à Gaz" announces that this year's Congress of the Société Technique de l'Industrie du Gaz en France has been fixed for June 15. Following tradition, the meeting will be held in Paris this year—last year's having been at Metz. It is intended henceforth to follow the old custom of having the Congresses alternately at Paris and in the Provinces.

Temporary Increase of Charges Act—An Order has been made by the Ministry of Health authorizing the Bedwelty Urban District Council to increase the maximum charge for gas from 5s. in a certain area and 5s. 6d. outside to 7s. 6d. per 1000 c.ft., subject to such rebate on the accounts of consumers of gas used for domestic or household purposes as the Board of Trade may prescribe as necessary to give effect to the deduction of 10s. per ton in the price of coal.

Midland Association of Gas Engineers and Managers.—Between forty and fifty members of the Midland Association of Gas Engineers and Managers (headed by their President, Mr. A. T. Harris, of Market Harborough) visited the Birmingham Section of the British Industries Fair last Thursday. Mr. R. J. Rogers, Superintendent of the Fittings Department of the Birmingham Corporation Gas Committee, had prepared a *précis* of the exhibits of special interest to the gas engineers. The party were much interested in their tour; and, owing to the magnitude of the display, many declared their intention of paying a second visit.

MIDLAND JUNIOR GAS ASSOCIATION.

A Meeting of the Midland Junior Gas Association was held last Thursday at the Council House, Birmingham, under the presidency of Mr. Carrington Barber. Several representatives were present from the Yorkshire Junior Gas Association.

A paper was read by Mr. Charles F. Tooby, the Works Manager of the Foleshill Gas-Works of the Coventry Corporation, entitled:

NOTES ON GASIFICATION.

Many different systems are in operation for the complete gasification of coal. Some of them are well-established on a practical scale; and the results which can be obtained by them are fairly well known. Others are said to be capable of yielding attractive results both from the financial and coal conservation points of view; but, unfortunately, no very definite exhaustive figures appear to be generally available at the present time.

The idea of complete gasification has been in the air for many years; and it is time the gas industry made a thorough practical investigation, with a view to ascertaining what really can be obtained in the way of yields, by the schemes which are being put forward. Then, with detailed working results available, it should be easy to decide whether complete gasification would pay in any particular case.

Steaming in vertical retorts is a step towards complete gasification; and the process is undoubtedly economical in most cases—even on a B.Th.U. basis. But it does not follow from this fact that it would pay to push the process to the extreme limit, and gasify all the coke. The various factors operating between the limit of partial and total steaming are not constant; and new factors enter at different stages.

In considering the question of steaming, the amount of coke available for sale is a most important matter, since the revenue from coke is one of the chief items in the financial balance-sheet. Widely different results have been published of the coke available for sale when high steaming—ranging from 7 to 12 cwt. per ton of coal. Of course, the class of coal, the size of the installation, and the varying stand-by fuel losses due to fluctuating gas demand, moisture in coke, &c., affect this; but, nevertheless, the figures are rather confusing.

It would appear (especially in view of the increased residuals) that the additional gas produced by steaming verticals can be made more cheaply than can blue water gas in separate plant—due, to some extent, to the great heat losses during the blow in the water-gas process. That all this "extra" gas obtained per ton of coal is not water gas is suggested by the figures given in the following table, which show approximately the percentage composition of this "extra" gas, calculated from the yield of gas per ton and the analysis when steaming, on the assumption that without steaming a yield of 12,200 c.ft. of gas of the following composition can be obtained:

CO_2	2·6
O_2	0·5
C_nH_m	3·0
CO	9·5
CH_4	27·0
H_2	50·0
N_2	7·4

The analyses in the case of steaming are not given here; but they are taken from published results, and relate to various systems of retorts.

Calculated Approximate Composition of the "Extra Gas" Obtained by Steaming.

—	1.	2.	3.	4.	5.	6.	7.
CO_2	6·3	8·5	9·2	16 3	5·9	2·1	5·3
O_2	Dec.	0·2	3·9	3·9	0·5	Dec.	5·5
C_nH_m	0·5	Dec.	Dec.	Dec.	0·7	Dec.	1·4
CO	35·0	33·8	12·9	6·1	23·6	21·4	19·5
CH_4	2·8	2·1	22·9	4·1	9·9	6·9	39·5
H_2	50·0	50·0	35·0	35·3	55·0	57·8	Dec.
N_2	5·2	5·7	16·3	34·3	4·3	11·7	28·7
Approximate gross yield per ton, in cubic feet.	20,000	30,000	15,500	15,000	20,000	15,500	20,000

Nos. 1 and 2 approximate fairly well to blue water gas. No. 3 is high in carbon dioxide, oxygen, and nitrogen, and is extraordinarily high in methane. No. 4 shows high carbon dioxide, oxygen, and nitrogen, and it would appear to indicate over-pulling and poor interaction between the steam and coke. Nos. 5 and 6 are good, although the hydrogen is high in comparison with the carbon monoxide.

It is interesting to note on the basis taken, in four cases out of seven, the unsaturated hydrocarbons show a decrease per ton of coal. Many hydrocarbons are undoubtedly protected by steaming; but many of them appear ultimately in the tar. From some points of view, steaming in verticals approximates to low-temperature distillation, combined with water gas production; and this raises the question as to whether it would pay to arrange the conditions so that a greater percentage of hydrocarbons could be obtained as gas.

Suppose a setting of vertical retorts is working at maximum coal throughout, making straight coal gas. The producers will be supplying the maximum amount of heat to the retorts; so that if steam be now admitted to the retort, obviously, if coke is to be carbonized as thoroughly as during non-steaming, the rate of coal throughput must be reduced to counterbalance the heat absorbed by the water gas reaction. From a cost point of view, it is important to know the extent of this reduction; in other words, the ratio of the total volume output of the plant when steaming to its output of straight coal gas.

With downward heating in vertical flues, the highest temperatures prevail in the top few feet—the temperature falling gradually from top to bottom of the flues. A very great amount of heat passes to the charge from the hottest portion of the flues, owing to the great temperature head between the flues and the ingoing coal; but only the outer portions of the charge attain anything approaching a high temperature, since much of the heat is absorbed in distillation. For lower positions in the retort, the degree of heat penetration into the charge is greater; but probably, owing to the decreasing flue temperature from top to bottom, there is only a very shallow horizontal slice of the charge which throughout its mass has a temperature sufficiently high for efficient water-gas production.

Steam passing vertically upwards through the outer portions of the charge has a good travel through high temperature coke; but travelling up the central portion it very quickly passes into a low-temperature zone and probably leaves the retort practically unacted upon. Therefore (with high top heats in the flues), in order to obtain high yields of gas per ton, it seems necessary to decrease the coal throughput very considerably, so as to shorten the coal core, and establish a well-defined high-temperature zone. With high bottom heats, a definite high-temperature zone exists normally, in the charge; and, when steaming, it should be unnecessary to reduce the coal throughput except to the comparatively small extent required to enable the producer to maintain the high temperature at the bottom, when steam is passing.

Assuming that coal and coke prices are such that economy on a B.Th.U. basis can be obtained by steaming, then the higher the cost of coal the greater the economy of steaming. With coal at pre-war prices, there would be very little gained by steaming, except where coke realized a very low figure.

Much has been written of the coal conservation which would accompany complete gasification. In the following figures I have endeavoured to set out a comparison of the B.Th.U. which could be actually utilized by consumers from one ton of coal by:

(1) Mond gas, with ammonia recovery.
(2) Verticals (non-steaming).
(3) Verticals (non-steaming), combined with gasification of the available coke in a separate water-gas plant.

In the hypothetical case for Mond gas, it is assumed that all power for the process is derived from Mond gas-electric sets, and that the additional steam (other than that derived from the air-tower) required for blast saturation, is obtained from boilers fired by Mond gas at 90 p.ct. efficiency. Steam for the sulphate plant and for tar distillation is not included.

MOND GAS.

135,000 c.ft. of 145 B.Th.U. gas	= 19·6 million B.Th.U.
Steam for blast saturation, including condensation losses, and steam for sundry purposes	2·25 tons per ton of coal.
Steam derived from air tower	0·8 ton per ton of coal.
Electrical units required for power	40 per ton of coal.
B.Th.U. used per electrical unit developed.	12,500.
Boiler efficiency on Mond gas.	90 p.ct.

On the above basis, 27,500 c.ft. of Mond gas would be required for power and steam-raising per ton of coal.

Mond gas per ton of coal available for distribution	= (135,000 − 27,500) c.ft. = 107,500 c.ft.
B.Th.U. available for distribution	= 107,500 × 145 = 15·6 millions.
Distributed and consumed at an average efficiency of 70 p.ct. gives	15·6 × 0·7 = 10·9 millions.
B.Th.U. actually utilized by the consumers per ton of coal	= 10·9 millions.

VERTICALS (NON-STEAMING).

Gas, 12,000 c.ft. per ton 550 B.Th.U.	= 6·6 million B.Th.U.
Coke available for sale after deducting all works' requirements, including all power	10·5 cwt.
Calorific value of coke	12,000 B.Th.U. per pound.
Total calorific value of the coke available per ton of coal	14·1 million B.Th.U.

Assume gas distributed and consumed at an average efficiency of 70 p.ct., as in the case of Mond gas.

B.Th.U. actually utilized from the gas	= 4·6 millions.
" " " " coke assumed for boiler-firing at 50 p.ct. efficiency	= 8·4 "
Total B.Th.U. actually utilized by the consumer from 1 ton of coal	= 13·0 "

VERTICALS NON-STEAMING AND ALL COKE AVAILABLE CONVERTED INTO BLUE WATER GAS IN SEPARATE PLANT.

Coal gas, same as in last example.	
Water gas from 10·5 cwt. of coke, reckoning 55 lbs. of coke per 1000 c.ft. (including boilers)	= 21·400 c.ft.
B.Th.U. in this water gas at 300 B.Th.U. per cubic foot	= 6·4 millions.
B.Th.U. in this coal gas	= 6·6 "
	13·0 millions.

Assume distributed and consumed at an average of 70 p.ct. efficiency, as in previous cases.

B.Th.U. actually utilized by the consumer from one ton of coal = 13·0 × 0·7 = 9·1 millions.

*** The calorific value of the tar is not taken into account in any of the systems.

From the foregoing it will appear that, although the blue water gas plant saves coal at the gas-works, it does not tend to the conservation of coal considered in a broad sense; also that the Mond process does not tend to coal conservation.

It is a well-known fact, but one which is sometimes overlooked, that it takes more fuel to carbonize a ton of coal in retorts or ovens heated by Mond gas producers than by the ordinary coke-fired furnace used in retort practice. By the ordinary method of coke-firing, 1 ton of coal can be carbonized by a consumption of 12 p.ct. of coke, equal to 269 lbs., whereas quite 18 p.ct. of coal must be put through the Mond producer, equal to 403 lbs. per ton of coal carbonized; and, in addition, more fuel must be allowed for, to cover power and steam requirements. The heat losses on a Mond plant are great—due to the large amount of steam and inert nitrogen passing through the generator. The carbon present in the CO_2 (16 p.ct.) contained in the finished gas is equivalent to about 35 p.ct. of the original fuel put into the producer, allowing for 15 p.ct. of ash and moisture in the fuel.

The following figures show the cost of fuel to a consumer for 100,000 B.Th.U. actually utilized in useful work in boiler-firing at an efficiency of 60 p.ct. for coke and 90 p.ct. for Mond gas.

Cost Price of Coke per Ton.	Cost of Coke for 100,000 B.Th.U. Actually Utilized.
20s.	1·5d.
30s.	2·3d.
40s.	3·0d.
Cost Price of Mond Gas per 1000 C.Ft.	**Cost of Mond Gas for 100,000 B.Th.U. Actually Utilized.**
6d.	4·5d.
8d.	5·9d.
10d.	7·4d.

Mond gas can be obtained in South Staffordshire for about 10d. per 1000 c.ft.; so that it would appear that fuel costs for coke-firing are very much the cheaper.

Probably the system of complete gasification which will possess the greatest possibilities will be that which gives a gas low in inerts, and consequently of a much higher calorific value than that yielded by the producer system.

Personally, I have many doubts regarding the general application of complete gasification as at present known for gas-works. I think that great efforts should be made to develop the use of coke; and, as illustrating the effect of coke prices, I would instance the case of coke-ovens, which, owing to the very high price obtained for the special coke produced, can probably supply B.Th.U. at a lower cost than verticals with high steaming.

DISCUSSION.

The PRESIDENT, referring to the author's observation that the gas industry should make thorough practical investigation of the subject of complete gasification, expressed the view that there ought to be a central body whose function it should be to test the various processes. This would be more satisfactory than the present arrangement of leaving such inquiry to be made by individual gas undertakings, with the inevitable overlapping of effort and waste of money. As to Mond gas, it was quite true that from a coal conservation (or financial) point of view it was not profitable; but on a works Mond gas had distinctive advantages in that it was possible to use up the poorer qualities of fuel, &c. He moved a vote of thanks to Mr. Tooby.

Mr. W. J. PICKERING (Birmingham), in seconding, pointed out that the idea of complete gasification was not a new one. In the interests of fuel conservation, it was most desirable that a thorough investigation should be made. Steaming in verticals was a paying proposition, and, quite apart from economical advantages, the process had been of great help during the past few years in maintaining gas output, notwithstanding decreased coal deliveries. Much yet remained to be done in the direction of conserving the heat that was now lost up the waste-gas stack, and the use of waste-heat boilers should play an important part in the future in this connection.

The resolution was heartily approved.

Mr. M'LUSKY (the President of the Yorkshire Junior Gas Association) said that, although steaming was not of high commercial value, its advantages to the industry were certainly considerable. During the period of irregular and inadequate coal supplies, it had been a salvation to many undertakings, in that it had enabled them to keep up gas supplies. As to the author's statistics regarding the conservation of the hydrocarbons during the steaming process, it appeared to him that if the calorific value of the tars had been included there would be more accurate figures as to the heat units available.

Mr. E. L. OUGHTON (Yorkshire Junior Association) commented upon the author's statement, under the heading "verticals non-steaming," "assume gas distributed and consumed at an average efficiency of 70 p.ct. as in the case of Mond gas." He inquired if he had any actual figures as to a broad average.

Mr. T. F. E. RHEAD, M.Sc. (Birmingham), said his view was that steaming vertical retorts was not by any means the last word in gas making. The future might possibly see a combination of modern producer and retort.

Mr. C. F. W. RENDLE (Redditch) said, in view of the probable sale of gas on a B.Th.U. basis, it would become most economical in the long run to get as many heat units out of the gas to the consumer as possible. Therefore, the question of steaming loomed largely. Verticals dealt best with a certain class of coal, and not necessarily those that undertakings had to receive at the moment. Another point for

consideration with regard to economical efficiency had relation to the size of the coke sales figure in the balance-sheet. Surely it must be a fact that the quality of coke produced for sale where steaming was carried to excess would be depreciated? Was the price for such coke altered as a result of the steaming?

Mr. TOOBY, in reply, said that while he recognized that there was an increase in the yield of residuals from Mond gas, he failed to see any advantage in its favour on the financial side. He did not think that Mond gas could be applied for general town gas use because of its low calorific value. If such a gas were sent out, the distribution cost would be materially increased. As to the question of the analysis of the gas with regard to hydrocarbons, he pointed out that it was not all water gas, but in some cases air or furnace gas. The composition of this extra gas must be carefully gone into before the results obtained could really be accepted. In reference to the economy of steaming, he thought it was all a question of the price of coke. If coke prices were low, it would always pay to steam. He had not experienced any real difficulty with verticals as regarded the use of different classes of coal. He agreed that Durham coal was sometimes troublesome, and thought that the best solution of the coal difficulty lay in having both horizontals and verticals on the same works. He was not aware that there was any variation in the price of steamed coke as compared with that yielded by normal working; and so far as his experience went, such steamed coke was quite as good in appearance as ordinary coke.

JOINT MEETING OF JUNIOR GAS ASSOCIATIONS

There was a Joint Meeting in Birmingham on Saturday of members of the Midland, London, Manchester, and Yorkshire Junior Gas Associations. It was convened so that a visit, in a collective way, might be made to the British Industries Fair at Castle Bromwich. Before going there, the members lunched together at the Imperial Hotel; the chair being occupied by Mr. C. Carrington Barber (the President of the Midland Junior Association. Supporting him were the Presidents of the London, Manchester, and Yorkshire Associations respectively (Messrs. S. B. Chandler, J. M'Lusky, and J. Alsop), Mr. W. G. S. Cranmer (the Hon. Secretary of the Midland Association of Gas Engineers and Managers), Dr. E. W. Smith, Mr. T. F. C. Rhead, Mr. W. J. Pickering, Mr. R. J. Rogers, Mr. H. W. Dean, and others. After a cordial welcome to the visitors by the Chairman,

Dr. SMITH addressed the members from the point of view of the gas industry as a whole in relation to the technical staffs and management. It was a thorny subject, he remarked, and one fraught with difficulties. Everybody desired that the gas profession should be a profession, and not merely an occupation. They desired that its status should be raised, so that it should be comparable with the Institutions of electrical, civil, and mechanical engineers, and kindred organizations. They had their Institution of Gas Engineers, and Senior and Junior District Associations, and so on; but there was no true basis of membership. Qualification should stand in any profession for something—he did not mean an academic qualification—and he did feel that if they wanted to raise the status of their profession more attention would have to be paid to the question of training and qualifications, both theoretical and practical. Things must not be left so much to haphazard as in the past. The gas engineering profession was a wider and more profound profession than any of those he had named. Its branches went so deep into science and engineering—though he did not distinguish between the two—and into other branches of learning, that it was difficult to say where one should stop in defining what should be the proper qualifications for a gas engineer. Even if one did, and were able to define them, he was afraid that by far the majority of the technical men in the gas industry would never be, and could never hope to be (say), full-fledged gas engineers, because there was only room for a small percentage of them. It would bar membership, if such qualifications were insisted upon, of a majority of those who were occupied in the profession of the gas industry. He thought what had to be done was to consider what form of training could be specified, which should be so graduated that men could branch out in various directions in order to specialize in different ways, and what should be the minimum of training necessary before membership of the Associations could be allowed. It was this "minimum" which was the thorny question. Like all Associations, where these things were properly organized, those who were in the profession were accepted as being in; and then it was a matter of time for the status to be raised. He believed—and he did not wish to be misunderstood or considered to be prejudiced—that certain general educational qualifications were absolutely necessary for all juniors who were brought into the gas industry, and who expected to go far. He did not wish to say that those who did not happen to have had this were any worse off, or less entitled to respect, for all recognized the valuable work they were doing.

"I am desirous of providing for the future," proceeded Dr. Smith, "for every other profession is so providing, and providing soundly." His plan for years had been, when engaging youths for industrial chemistry, to require an educational standard, not necessarily the matriculation standard, but a standard in essential respects more or less equivalent to it. It was not fair to accept a boy at the present time, and to indicate to him that he had prospects of a great career in the industry, if he was not reasonably well educated. With few exceptions, boys not educated would not go far. All he wanted to insist upon was that they should gradually come round to the view that professional institutions should eventually be based on sound qualifications, and that they should start providing for that period now, if they had not already started in this direction. His next point was that of economics. One of the chief reasons for there being a lack of training in the gas industry was that the industry had never made it attractive enough. Many had felt the pinch during the war; and his belief was that only two things would save the profession as such—financially and economically. They were: (1) That there should be a change of heart in boards of directors and committees of management, and that increased remuneration should be given; and (2) that the whole of the technical side of the gas industry should be co-ordinated, consolidated, and unified. There was in process of being formed what was known as the National Association of Technical Gas Officials. It was actually alive; and he thought it had great prospects. But the majority of the technical staffs of the industry had got justification for believing that it was on its last legs. There was not sufficient information available, so that one might know the precise position. He happened to be on a Committee in connection with it; and he knew there was life. The Association had its constitution, and the scheme for organization was fully worked out. As one who was connected with it in a rather informal way, he would like to demand that those who were running the Association should come out of their shells, publish their names, and give some standing to the project.

Everybody wanted co-ordination among the technical staffs. He believed the majority felt that it was only by organization and unification—which enabled them to discuss among themselves various matters connected with the industry, and in this way they would get to know one another's point of view—that they could act together. Even if salaries were perfectly satisfactory, there ought to be an organization in being that could stand for the whole of the technical staffs. If there was nothing to demand, and nothing wrong, there should exist an organization to act when occasion required. It took years for such a movement to develop, and for individuals to have confidence in it. They could not trust an organization to act for them in matters which were their own private interests unless they could trust the men who were running it. Obviously, they could not be trusted unless they were known; and if they were not known, there was no use in having an organization. One thing was clear, that matters could not be dealt with in a piecemeal way. With unification and with solidarity of action, there need be no fear. The more members there were in an organization, the more one could afford to act in a reasonable kind of way. The less representative a concern was, the more localized it was, the more likelihood was there that a few hot heads would act in a way that would be bad for themselves and for the profession as a whole. He urged them seriously to consider the question of joining the Association, which was democratic, and in which there was nothing "cut and dried."

A vote of thanks was passed to Dr. Smith, on the motion of the CHAIRMAN, seconded by Mr. CHANDLER.

VISIT TO THE BRITISH INDUSTRIES FAIR.

The party then proceeded to Castle Bromwich; and a pleasant and instructive afternoon was spent.

The visitors paid their tribute to the Hon. Secretary (Mr. Dean) and the Committee for the excellent way in which they had made the arrangements for the visit.

Sulphur in Coal.

In the Chemistry Department of the Engineering Experiment Station of the University of Illinois, says the "Gas Age," a thorough investigation has been made of the nature of the four sulphur compounds in coal, the quantity of each form present, and the change which characteristic forms undergo when the coal is allowed to stand or is subjected to coking. The following methods were developed for the quantitative analysis of each form of sulphur: (1) The sulphate sulphur was determined by extraction of the coal with dilute hydrochloric acid. (2) The pyritic sulphur was determined by extraction of the coal with dilute nitric acid; it having been found that nitric acid of a certain dilution has a selective action on sulphur combined as iron pyrites. (3) The resinic sulphur was determined by extraction of the coal with phenol. (4) The humus sulphur was determined either by a direct method or by the difference between the sum of the other three forms and the total sulphur in the coal. The devising of such methods of analysis has been much sought after in recent years by coal and coke investigators, but without satisfactory results up to the present time. The methods here proposed have been put to extended tests, with very satisfactory results.

A Gas Power Home Workshop.—The "Motor" describes a home workshop, equipped for carrying out necessary repairs; the plant including a ¾ H.P. Gardner gas-engine. A coke-stove is fixed in one corner, and the cast-iron pipe taken up and through the side of the building. The shop is lighted by one large incandescent gas-burner in the centre of the roof; a shilling-in-the-slot meter being used, so that the cost of gas is easily checked. At the present price of gas, the engine costs 1d. per hour; but as the price of gas is likely to rise, this may increase to 1½d. But, says the "Motor," even then this is very economical running.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The South Metropolitan Gas Bill.

SIR,—Please allow me, through the medium of your columns, to thank Mr. Harry Jones for his heartening reference to, and warm approval of, the South Metropolitan Bill, and of its promotion.

Widely experienced as he is, he knows that in principle, at least, what would bring relief in South London cannot be much amiss for other parts.

In this he shows a breadth of judgment antipodal to the narrow minded sciolists who, I have been informed on high authority, are doing their best to block and injure the prospects of our Bill.

Things have indeed come to a pretty pass when organizations formed ostensibly for the general good of the industry are diverted from their purpose to interfere with independent undertakings. Let us hope they will take the hint Mr. Jones gives them, and confine their activities to their proper channels.

CHARLES CARPENTER.

Feb. 28, 1920.

The South Suburban Gas Bill.

SIR,—With reference to the editorial comments in this week's "JOURNAL," and in order to avoid any possible misunderstanding on the subject, may I say that, for the revision clause in the South Suburban Gas Company's Bill, that Company are wholly and solely responsible.

CHAS. HUNT.

17, *Victoria Street, S.W., Feb.* 27, 1920.

National Association of Technical Gas Officials.

SIR,—The letter of the "Gas Engineer's Clerk" in your issue of Feb. 3, pleading for a widening of the scope and foundation of the above-named Association, has surely expressed the thoughts of very many gas officials. The technical, administrative, and commercial staffs of gas undertakings are, in these days, brought so closely into contact with each other, and the success of the industry as a whole (with which the welfare of each class is inevitably bound-up) depends so very much upon the co-operation of all three, that the formation of an Association which should comprise all gas officials, seems not only natural, but extremely desirable.

Your leading article in the same issue, which refers to the letter I have mentioned, reminds readers of the proposal for a "Federation of Organizations" representing the professional and supervisory classes; and in the list of such organizations already in existence given by you, gas is conspicuously absent. The increased cost of living, however, affects officials in the latter industry equally with others; and if the industry is in future to attract the class of man necessary for its advancement, it is plain that an Association for the advancement of knowledge, the improvement of methods, and for the maintenance and improvement of status and salaries, is urgently called for.

VISTA.

Feb. 27, 1920.

REGISTER OF PATENTS.

Extracting Coke from Retorts.—No. 124,719.

NERRIERE, A. J., of Saint-Brieux, France.

No. 4604; Feb. 24, 1919. Convention date, March 28, 1918.

The invention relates to the general class of apparatus in which the coke extracting mechanism is inserted into the retort without interfering with the charge therein. While having reached the requisite position adjacent to the charge to be extracted, a movement imparted from outside the retort causes the mechanism to engage the charge of coke so that, on withdrawing the mechanism from the retort, the coke is extracted with it. The advantage claimed for the extracting mechanism according to this invention "resides in the fact that the coke-extracting rake can automatically adapt itself to any deformation of the retort which may occur under the action of the heat to which it is exposed."

The illustrations show an elevation of the apparatus as a whole, a partial plan, and a side view.

The extracting bar consists of a double T-iron A, to which are connected two rods turning in bearings. Each rod terminates at one end in arms having supporting pins, on which is mounted a rake. Slots formed in the rake allow of its movement relative to the arms. The other extremities of the rods are bent so as to form levers by means of which they can be given a rotary movement, so as to occupy either a raised or lowered position. The T-iron is fixed to a carriage B having wheels which can travel upon a vertical rail C. A locking member D, hinged on the carriage, serves to hold the arms in one or the other of its extreme positions, through the intermediary of two arms in each of which two notches are cut to hold the levers. Rotary motion is imparted to the locking member D by a lever. The track C is fixed to the transverse carriage E of an ordinary travelling crane upon which is mounted a pulley F, which serves to impart a rising and descending motion to the carriage on its track.

The travelling crane L might be the one used for charging the retorts; and in this case, it would be completed by the addition of the carriage E and its horizontal path of travel G, so as to allow of giving the extracting bar the horizontal movement necessary to introduce it into, and withdraw it from, the retorts H. The transporter I is arranged to travel along a mono-rail J—when it moves transversely of the retorts.

The method of operation is as follows: The distillation of the coal in the upper retort H being finished, the extracting rake is contracted and the carriage E is put in its extreme left-hand position, and the extracting rod brought opposite the retort by manipulating the crane L and the carriage B. It is then caused to enter the retort by actuating the carriage E in such a manner that the rod lies between the top of the retort and the top of the coke-cake K. Once the extracting bar is in place, the levers are unlocked and drop the rake head so as to withdraw the rod (and the coke with it) on the motion of the apparatus being reversed.

Supporting Incandescent Gas-Mantles.

No. 137,794.

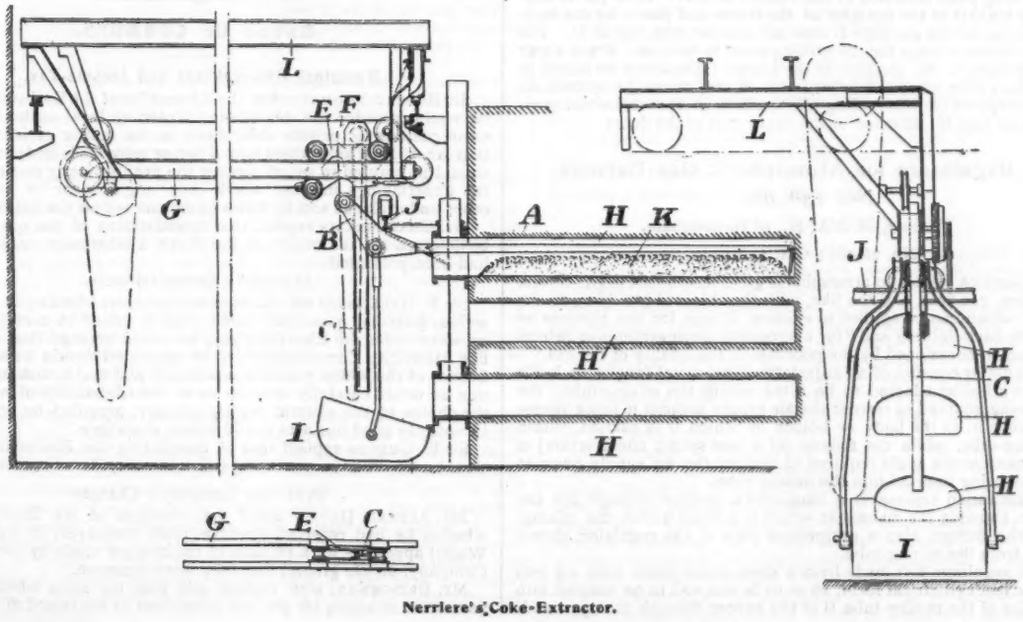
WILSON, J., of Birmingham.

No. 26,752; Oct. 10, 1918.

According to this invention, in order to support a flexible mantle on an upright atmospheric gas-burner which has a top burner cap fixed to it, a wire crutch or rod which has its bottom part bent upwardly is fixed between the burner and cap (preferably in a vertical groove), and then clamped in a slot in the burner-tube—the top end of the crutch or rod being bent to form a mantle supporting ring or arm. When applied to an inverted burner, two or more wire supports are employed in grooves in the cap of the burner. They are made short and project laterally from the burner, so as to serve as hooks on to which the mantle surrounding the lower part of the burner can be hitched—the bottom ends of the shanks being bent and clenched in the slots of the burner tube.

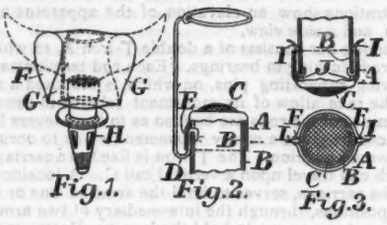
Fig. 1 is a perspective view of an upright incandescent burner and mantle. Fig. 2 is a sectional elevation of the upper part of the burner. Fig. 3 is a sectional elevation and plan of the lower part of an inverted form of burner.

The cap A is adapted to fit comparatively tightly on to the tubular shank B of the burner; being perforated or fitted with a wire gauze disc C. The mantle rod is formed of a piece of nickel chrome or other



Nerriere's Coke-Extractor.

heat-resisting wire shaped so as to stand up at the side of the burner and having its lower end bent upwardly at D and inserted in a slot in the burner shaft and clenched back inside. The wire is clamped tightly between a vertical groove E on the inside of the cap and the outside of the shank of the burner. The rod is carried upwardly for the required distance and then bent into a horizontal arm or into a ring of the proper size to fit into the top of the mantle, and to slightly open apart the two sides of it F G.



Wilson's Incandescent Mantle Supports.

The burner shown in fig. 1 is intended to give a small flame, and has a minute gas inlet hole in its otherwise closed bottom end, and above this the necessary air-gaps.

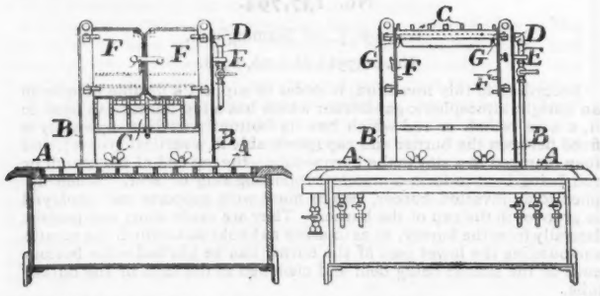
In the inverted burner, to support a mantle the necessary laterally projecting spikes or hooks of the cap are formed of wire hooks I, the lower ends of which pass through, engage with, and are clamped in, slots J in the bottom of the burner shaft.

Grillers for Gas-Cookers.—No. 138,157.

South Metropolitan Gas Company and Chandler, D., of Old Kent Road, S.E.

No. 2098; Jan. 28, 1919.

According to this invention, the griller is a separate, collapsible structure comprising a grilling plate pivotally connected to a frame adapted to be mounted at the back of the hot plate, and which can be opened out when required for use, but at other times stands folded up within the frame, leaving the whole of the hot plate available for cooking operations, which are not necessarily interrupted even when the griller is in use.



Chandler's (South Metropolitan Gas Company) Grillers for Gas-Cookers.

The illustration shows a front view, partly in section, with the griller folded up out of use, and a front view with the griller in position for use.

The hot plate of the cooker A needs no special description. B is a rectangular metal frame to be attached to the back of the hot plate. C is a grilling plate attached to the venturi tube D. It is partly supported by sockets in the uprights of the frame and partly by the horizontal portion of the gas-pipe E inserted into the open end of D. The tube thus forms a hinge for the grilling plate to turn on. F are a pair of doors hinged to the uprights of the frame. These can be folded in front of the griller when the latter is out of use, or can be opened-out to form a support for the grilling plate, which in the horizontal position rests on lugs G, attached to the upper part of the doors.

Air Regulators for Atmospheric Gas-Burners. No. 138,302.

Pember, H. & A. H., of Birmingham.

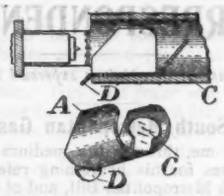
No. 26,069; Oct. 24, 1919.

This invention relates to atmospheric gas-burners used in gas-stoves, gas-cookers, gas-fires, and the like, with the object of providing an air-regulator which can be applied to existing fittings for the purpose of preventing back-lighting and "for overcoming derangements or defects in combustion occasioned by the poorness in the quality of the gas."

The regulator consists of an adjustable sheet-metal tongue or baffle carried by a holder adapted to be fitted within the mixing-tube; the tongue being adapted to restrict the air supply without it being necessary to move it, or the body or holder by which it is carried, within the mixing-tube, while the tongue (of a non-spring construction) is bent by hand to the angle required to restrict the air supply prior to the device being inserted into the mixing-tube.

The illustration represents a longitudinal section through the air-regulator, showing the manner in which it is fitted within the mixing-tude of the burner, also a perspective view of the regulator, shown removed from the mixing-tube.

The air-regulator A is made from a sheet-metal blank bent up into a more or less cylindrical form, so as to be adapted to be inserted into the interior of the mixing-tube B of the burner through the open end.



Pember's Air-Regulators for Atmospheric Gas-Burners.

The inner end of the regulator has an integral tongue-like extension C, of a non-spring construction, which may be bent upwards by hand to any desired angle prior to the device being inserted into the mixing-tube, so as to constitute a baffle and more or less reduce the effective diameter of the mixing-tube, and thereby restrict the supply of air drawn into the tube, without its being necessary to move the device. Thus by bending-up the baffle more nearly at right-angles to the axis of the mixing-tube, the air supply is reduced, and the mixture of air and gas rendered proportionately richer. The outer end of the regulator is also formed with an integral tongue D, bent downwards so as to form a means for inserting and removing the regulator.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Feb. 25.]

Nos. 4601-5324.

Brooke, T.—"Governing flow of air or other gases through pipes, flues, &c." No. 4995.
Bull, H. J. (legal representative of Helgeby, H., and Schieldrop, B.)—"Carbonizing coal." No. 4977.
Bulpitt and Sons.—"Gas-lamps." No. 5251.
Bury, E.—"Treatment of carbonaceous matter." No. 4988.
Cheetham, A. S.—See Bulpitt. No. 5251.
Cranston, W. M.—"Atmospheric gas-burners, &c." No. 4822.
Helgeby, H.—See Bull. No. 4977.
Jones, F. B.—See Bury. No. 4988.
Kennedy, J. E.—"Retorts." No. 5220.
Madsen, H. A.—"Recording differential thermometer and calorimeter." No. 5001.
Minerals Separation, Ltd.—See Bury. No. 4988.
Rotherham, K.—"Taps, stopcocks, &c." No. 5158.
Schieldrop, B.—See Bull. No. 4997.
Sloman, A. J., J., & V. A.—"Gas-stoves." No. 5240.
Tully, C. B.—"Gas-producers." No. 5099.
Walker, C. B.—"Apparatus for generating producer gas." Nos. 5002, 5003.
Watson, A. E.—"Adjusters for gas-burners." No. 4624.
Williams, C. H.—"Gas-lamps." No. 5251.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

In the House of Lords, the following Bills were read a second time, and committed: Rugby Gas Bill, Wandsworth, Wimbledon, and Epsom District Gas Bill, Maidenhead Gas Bill.

On the second reading of the Great Northern Railway Bill, Colonel Newman and Sir Herbert Nield will move "that it be read a second time upon this day six months.

HOUSE OF COMMONS.

Municipal Undertakings and Income-Tax.

Sir Robert Thomas asked the Chancellor of the Exchequer whether he would consider the desirability of placing local authorities in the same position as private individuals in the matter of income-tax, so that where local authorities owned two or more trade undertakings they should be entitled to set-off against the profits of any one or more of the undertakings the loss which they might incur in any of their other undertakings and be liable to income-tax on the net result.

Mr. Chamberlain replied that consideration of the question must be deferred till the report of the Royal Commission on Income-Tax had been presented.

Electricity Commissioners.

Sir F. Hall asked the Minister of Transport whether, in view of the serious financial questions which were involved in carrying out the schemes under the Electricity Act, he would arrange that one of the five Electricity Commissioners to be appointed should be an expert in finance of the widest possible experience, and that in making the selection he would carefully consider as to the advisability of not limiting the choice to the electric supply industry, provided he could obtain thoroughly good business qualifications elsewhere.

Sir E. Geddes replied that in completing the Electricity Commission, he would have special regard to the considerations mentioned.

Ryde Gas Company's Charges.

Mr. Alfred Davies asked the President of the Board of Trade whether he had received a petition from ratepayers in Ryde (Isle of Wight) appealing for a revision of the charges made by the Ryde Gas Company, on the ground that they were excessive.

Mr. Bridgeman, who replied, said that the price which the Company were charging for gas was authorized by the Board of Trade after

careful consideration of the circumstances of the undertaking, and was estimated to be not more than sufficient to enable the Company to pay a dividend of 3¾ p.ct., which was three-quarters of their standard dividend. If the profit earned by the Company was in excess of the amount required to pay this dividend, it would be necessary for the Board of Trade to reconsider the matter, with a view to reducing the price.

Dye-Products and Prices.

Major BARNES asked the President of the Board of Trade the cause of the delay in calling together the Committee appointed by the Central Profiteering Committee to inquire into the effect on prices and profits of dye products of the action of the British Dyestuffs Corporation.

Sir A. GEDDES, in reply, said that some delay had arisen in calling together the Committee owing to the desirability of extending the scope of the terms of reference and the possible appointment of additional members from outside the membership of the Central Committee. It was hoped, however, that they would meet at an early date.

Export Coke Prices.

Mr. WILL THORNE asked the President of the Board of Trade if he was aware that the South Wales coke manufacturers were exporting coke at a record price of £7 per ton; if he could state the amount per ton that was paid for the small coal used for making coke; and if he could state the amount of profit that was being made out of a ton of coke that was now being exported at the price mentioned.

Mr. BRIDGEMAN (the Parliamentary Secretary to the Board of Trade), who replied, said that inquiries were being made, and the hon. member would be informed of the result.

UNEMPLOYMENT INSURANCE BILL.

A Bill has been introduced to amend the law in respect of insurance against unemployment.

The memorandum states that the Bill extends the contributory scheme of unemployment insurance to substantially all the persons falling within the Health Insurance Scheme, with the exceptions that agriculture and domestic service are not included; and in Ireland the Bill applies only to workmen in the trades now insured against unemployment under the existing Acts. The Bill further enables the Minister of Labour, with the approval of the Treasury, to make orders bringing within the scheme of unemployment insurance any of the industries thus excepted.

The amount of unemployment benefit will be 15s. per week in the case of men, and 12s. per week in the case of women, as compared with a benefit of 11s. under the existing Acts. The contributions in respect of the insured contributors will be in the case of men 3d. per week from the employer and 3d. per week from the employed; and in the case of women, 2½d. per week from employer and employed respectively. Certain lower rates of contribution and benefit are proposed for boys and girls between the ages of 16 and 18. The State will contribute one-third of the combined contributions of employers and workpeople.

Associations of employed persons will, subject to certain conditions, be allowed to pay their members unemployment benefit to which they are entitled, and will be repaid such expenditure out of the unemployment fund. In consideration of undertaking this duty, the Associations will be entitled to receive a grant in aid of administration expenses not exceeding 5 p.ct. of the amount repaid to them.

An opportunity will be afforded for industries to contract-out of the general scheme by setting-up special schemes of their own, giving equal, or superior, advantages, such as may be approved by the Minister of Labour under special order. Power is also reserved to the Minister, if he thinks fit, to set-up a special scheme, on his own initiative, for any particular industry. In cases where special schemes are set-up, a State grant will be paid not exceeding one-tenth of the estimated amount of the contributions which would have been payable by the employers and employed if they had remained under the general scheme. Industries in which a special scheme is not set-up may nevertheless provide by means of a supplementary scheme for unemployment which is not covered by the general scheme. No State grant will be paid in the case of supplementary schemes.

It is estimated that about 11¾ million persons will be covered by the Bill; and out of this total there may be between 1½ and 4 millions under special schemes. The annual cost to the Exchequer under the Bill will be from £3,000,000 to £4,000,000. The annual cost of unemployment insurance to the State at present is approximately £1,250,000.

Extensions at the Scunthorpe Gas-Works.—At the last meeting of the Scunthorpe and Frodingham Urban District Council the Gas Committee reported that Mr. W. Doig Gibb, who had carefully examined the gas manager's scheme for the erection of new gas-works in Dawes Lane, Scunthorpe, was firmly of opinion that the possibility was remote of new plant being erected on the site capable of affording a supply of gas for the next winter season. He therefore urged the Council to take immediate steps to enlarge the productive capacity of the existing gas-works by the installation of a carburetted water-gas plant capable of producing 300,000 c.ft. per twenty-four hours; and this the Council decided to do.

Dudley Gas-Works Ownership.—The Dudley Trades Council on Thursday week received the reply of the Town Clerk to their resolution urging the municipalization of the gas undertaking. The Town Council asked for suggestions as to how the concern could be made an economic success. It was decided to point out to the Town Council that this was not the duty of the Trades Council. It was also asked if the members of the Dudley Town Council were less capable of dealing with questions of this kind than Wolverhampton, Walsall, Stourbridge, or Tipton. The Chairman (Mr. S. Webb, J.P.) thought that ownership at Dudley might not be a success, if they were to measure the capacity of its public men by the way in which the electricity concern was handled.

MISCELLANEOUS NEWS.

LONDON COUNTY COUNCIL.

Gas Legislation: Motor Fuels.

At last Tuesday's meeting of the London County Council the report of the Public Control Committee [see *ante*, p. 442], dealing with the promotions of Metropolitan Gas Companies during the current session of Parliament, was adopted without debate.

In the course of the proceedings of the Council, Mr. J. P. Blake (member for East Islington) asked the Chairman of the Public Control Committee whether his attention had been drawn to the large increases in the prices of imported motor spirit; and, in view of the importance of cheaper motor spirit as a factor in reducing the cost of living in London, whether the Committee would consider the advisability of supporting the petition to the Government of the Automobile Association in favour of increasing supplies of home-produced motor fuel?

In the absence of the Chairman and Deputy-Chairman of the Committee, Mr. W. Reynolds (Hampstead) said the attention of the Committee had been called to the matter; but the Committee was concerned only with the question of the safe keeping of the spirit. He added, in regard to the petition, that the method known to the Council of increasing the home supplies of motor fuel was to extract from ordinary coal gas the benzol vapours it contained. It was these vapours which added to the illuminating and calorific power of the gas. This extraction was followed during the war as an emergency measure, and the natural consequence was that gas of inferior quality was supplied to the consumer. Under the scheme proposed by the Fuel Research Board (which it is understood will be the subject of Government legislation), it will be possible for the gas companies to declare the calorific value of the gas they intend to supply. By an arrangement of this kind the companies can name such a value as will enable them to obtain benzol and other alcohol and vapours in such quantities as may be very useful—in fact, in large quantities—so providing that the gas consumer is adequately protected. He added that it was possible that the Public Control Committee would be advised to recommend the Council to support the petition mentioned.

BRITISH INDUSTRIES FAIR (BIRMINGHAM).

IMPORTANT DISPLAY OF GAS APPLIANCES.

[NOTES BY A LOCAL REPRESENTATIVE.]

The Birmingham Section of the British Industries Fair is of singular interest to the gas engineer, and to many other persons identified with subsidiary branches of the industry. The Fair, which is situated at Castle Bromwich—a village about five miles from the centre of Birmingham—is contained in three huge aerodrome buildings (until recently used for the manufacture of the Handley Page machines). The Lord Mayor of Birmingham (Alderman Cadbury), who formally declared the Fair open on Monday of last week, stated that an effort would be made to obtain the permanent use of the buildings, so that the event might be held annually. His Lordship pointed out that we could not have a real and lasting peace until it was realized that nations were dependent upon one another, and that, in fact, there must be a true brotherhood of nations. As a nation, we could not occupy a proper and essential position unless exporting and importing were carried on simultaneously.

There was a large company representative of the public and business life of Birmingham and the Midlands at the opening ceremony. In moving a vote of thanks to his Lordship, Mr. H. C. Field, the President of the Birmingham Chamber of Commerce, declared that interchange of trade was one of the greatest of curbing influences.

Owing to the great technical interest of the Fair, it has been arranged for the attendance daily, in relays, of gas salesmen, district inspectors, and gas-fitters in the employ of the Birmingham Gas Department. A good deal is to be learned on subjects such as jointing, as all kinds of such work, including lap welded and electric, are to be seen.

Continental visitors to the Fair have included M. E. Simon St. Just, D.Sc., the Chief Engineer of the Public Service Department of the Paris Gas Company; and M. Jacques Lévy, the Engineer of the Physical Department of the Company.

The Exhibits.

There are nearly 700 stands; and these cover a space of 150,000 sq. ft. In addition, a number of kiosks have been provided outside the main buildings; and the Gun Section is located in the Birmingham Art Gallery. The chief features are general hardware, metal goods, gas and electrical appliances, motor and pedal cycles and general accessories, and oils, colours, paints, varnishes, enamels, &c.

The outside kiosks are lighted by incandescent inverted burners, and heated by 4-loop "Floral" radiators; while on the carriage-way are fitted lamp columns with "Lyttleton" 700 c.p. inverted lamps. The gas is conveyed to Castle Bromwich by a special main; and a gas-engine driven booster is employed.

As indicated, a considerable section of the Fair is given up to displays of the stove manufacturers; and one of the things that impresses the visitor is the great improvement on the artistic side. The note is more restrained, refined, and artistic; the flamboyant is disappearing. Every device, too, which tends towards slow combustion receives emphasis. In a range and stove there is ever a striving for greater economy of fuel side by side with a general development of the domestic hot-water system connected with bath-room and scullery. The development of housing plans is giving an enormous impetus to water heating by gas; and a variety of designs of apparatus suitable

for cottage use is to be seen. There are gas water-heaters for use as separate units, or for alternative use with a coal-range.

With regard to gas-stoves, it would appear that a very general effort is being made to increase the local character of the heat radiated direct from the fuel by supplementing it with a volume of hot air passed behind the fire. By this means it is claimed that much of the heat generated by the gas is diffused. Radiation is also aimed at by semi-circular burners. Again, small gas-fires are being so constructed that they can be placed close up to a wall, and so obviate the construction of chimneys, &c.; the outlet being by a cheaply constructed flue passed through the wall.

Many other points of interest have relation to gas for power and general heat treatment work; to the utilization of the high-pressure silica cup lamp (doing away with the outside globe) for street lighting, &c.; and to the improvements in the production of the incandescent mantle. The operations showing the manufacture from start to finish of the "Ironclad" mantles attracted great crowds.

The Fair was visited last week by many technical societies—including the Midland Gas Managers on Thursday, and the Midland Junior Gas Association on Saturday. The latter had, as guests, visitors from other centres.

Birmingham Corporation Gas Department.

The Birmingham Gas Department show special laboratory apparatus; also new types of furnaces, including electric furnaces. On the stand is a Belliss and Morcom 4 I.H.P. gas-engine direct coupled with an electric generator. There are also items of interest of the work executed by the Industrial Research Department. On another stand, the Gas Department have fitted two Keith-Blackman compressors, direct coupled with "Gardner" gas-engines. These compressors work in duplicate, and are run on alternate days for supplying the high-pressure gas to the 1000 c.p. lamps in buildings "B" and "C." The capacity of the compressors is 1000 c.ft. per hour each, with a working pressure of 4 in. mercury column.

Messrs. Parkinson & W. & B. Cowan, Ltd.

A stand of interest is that of Messrs. Parkinson & W. & B. Cowan, Ltd., of Birmingham, on which is shown a variety of gas-meters, wet and dry, and prepayment and ordinary, and meter measuring drums, including the Warner & Cowan self-regulating drum. High pressure meters are shown fitted with patent compensating index, which automatically corrects the volume of gas passed to normal temperature and pressure. High-pressure safety gas-governor (Short's patent) is clearly demonstrated; the cut-off valve automatically coming into action in the event of an accident to the service or rupture of the diaphragm, effectually cutting off the supply. A series of working models are exhibited, comprising station meters and equilibrium governors, retort-house governors, test gasholders, &c. The Parkinson recording gas calorimeter (Beasley's patents) is shown under working ronditions. This instrument is sensitive and accurate in working, and is extensively used at home and abroad. Test and experimental meters of various capacities are shown, including the patent escapement meter as used in the calorimeter. This, besides accurately measuring the volume passed, ensures a constant rate of flow, unaffected by variations in specific gravity, or, in fact, any other slight frictional or pressure variation. There is also a portable dry test meter, which is supplied in a canvas case for carrying, and fitted with connections of different sizes for testing meters *in situ*. The percentage of error is read directly off the dial. Pressure gauges of various patterns are shown, including King's gauges, differential gauges, inspector's pocket gauges, mercurial gauges, &c. The firm also show an interesting range of requisites for public lighting and general outside use for gas.

Eagle Range and John Wright & Co.

An important contribution to the display is made by the Eagle Range and Grate Company, and Messrs. John Wright & Co., of Aston, Birmingham. On the latter's stand, the New Eagle gas-range, the higher efficiencies of which have already been described in the "JOURNAL," holds pride of place. In connection with housing enterprises, a cast-iron gas-heated wash-house boiler, the "Novo," is worthy of a little attention. It is designed for utility and service with economy. The pan, like the outer case of cast-iron, is treated by the Bower-Barff process as a protection against rust; and with ordinary care satisfactory results are attained. A surrounding ridge keeps water from running over on to the floor. It slopes inwards, and drains the water back into the boiler. There are no corners or ledges for dust to settle on, and no sharp edges to injure the hands or clothes. There is no danger of rust and ironmould. The lid can be entirely removed when desired, giving free access to the boiler all round. It can also be used as a tray for carrying the hot clothes away. The firm's "B.T.U." circulator and storage tank set, which is being used to an increasing extent in cottage equipment, possesses one advantage in that the gas consumption can be controlled and economized by an automatic valve, so that it is not necessary to heat more water than is required. There is also displayed a large variety of "Thermo-X" gas fires and grates and radiators, with the injector-ventilating process. Artistry in open hearth gas-grates make a strong appeal; and the chaste designs of the "Kenilworth" and "Baskerville" dog-grates command more than usual attention. Messrs. John Wright and Co. are developing their output on the kitchen side with combined gas fires and cookers; and an apparatus which has the merit of compactness and convenience is known as the "Cabinet." Singularly suitable for use in flats and suites of chambers, it has the gas-fire at the botton, an oven, capable of accommodating a small joint above, and on the top provision is made for boiling a kettle.

Richmond Gas Stove and Meter Company.

The note of comprehensiveness characterizes the exhibits of the Richmond Gas Stove and Meter Company, Ltd., of Warrington and London. It is from the industrial aspect, however, that the display will chiefly cause a halt. Here one gets a very fine illustration of the great possibilities of gas for power purposes. The furnaces are of singular interest. One is a large low-pressure gas and air oven furnace for the general heat treatment of metals. The air is brought in at the same pressure as the gas (approximately 2 in. water-gauge), and is pre-heated by means of the waste products from the gas chamber. Combustion takes place in the furnace chamber under the furnace arch. A new type of high-speed steel-hardening furnace (of the Sheffield type of forging furnace) is shown. This is for heating-up bars and billets for forgings. Other features include an air-blast high-speed steel hardening furnace, and a natural draught gas-heated regenerator twin-oven furnace. On the domestic side, the Company have a fine selection of gas-fires. Prominent in these is one for radiant heat distribution, with semi-circular fire, fitted with silent burner, and, finished in "armour bright," suggests taste and elegance."

Messrs. Arden Hill & Co.

Ventilating gas fires, cookers, and cooking and water heating apparatus and appliances for hospitals, canteens, and large establishments constitute, broadly, the stand of Messrs. Arden Hill & Co., of Birmingham. On the gas-cooking side, the Company give prominence to the "Super-Acme," which is made in seven sizes; and for water heating, to the "Zenith" gas-heater and storage tank and the "Acmefont" circulator and tank. The advantages of these are, of course, well known. Their great asset, however, is that the facilities provided enable one to heat just the amount of water that may be required; and this at a minimum of expenditure. Cooking apparatus on large-scale lines are shown. Many of the examples are peculiarly suited for works' canteens. A good feature is a carving table and hot-closet with plain top.

Tilley High-Pressure Gas Syndicate.

The great aerodrome buildings are lighted by the Tilley high pressure gas-lamps; and it must frankly be admitted that the Syndicate's display is of very considerable trade interest. Featured, is the soft ray high-pressure gas-lamp with silica cup, of 1000 c.p. The lamp is suitable for outside or window illumination; and the light given is powerful and diffused. There is an absence of hard shadows, and, of course, the need for an outside globe is obviated. The firm also exhibit a variety of high-pressure stoves for the use of tin men, and internally-heated soldering bolts, &c. The copper bit on the bolt may be easily removed for reforging or replacement by a clamping device. The appliances certainly suggest high efficiency.

On the Company's stand are fitted two 1000 c.ft. per hour Tilley gas compressors. These compressors are in duplicate, and each one is run on alternate days. A 3 in. low-pressure gas supply pipe is run to the compressor. The gas is compressed and passes through to the lamps. In Building "A" there are 45 lamps, each of 1000 c.p., fitted with automatic lighters. The compressors are driven by a 10 H.P. motor. The motor is also utilized for driving the dynamo to generate the electric current for the accumulators for the "run-about" electric vehicles used in the exhibition. The pressure of the gas, when compressed, is 4 in. mercury column. In addition to the general lighting of Building "A," the gas compressed is also used on the next stand for the Tilley High-Pressure Gas Syndicate, to demonstrate their high-pressure lighting and heating apparatus.

Parkinson Stove Company,

The Parkinson Stove Company, Ltd., of Stetchford, Birmingham, show ingenuity and resourcefulness in their new productions to meet modern housing needs. They give prominence to a "New Cottage" water-heater, which is a dual self-contained apparatus for the supply of small or large quantities of hot water at will. The needs of the bath-room will in many cases be found to be adequately met by their new "Teba" geyser. The Company's convection-radiant gas-fire, the "Conrad," is prominently displayed.

Mantle Making at Messrs. Curtis's and Harveys's Stand.

Large crowds gather throughout each day in front of the stand of Messrs. Curtis's and Harvey, Ltd., of London. Here are to be seen a good deal of running machinery and other apparatus, and "while you wait" one is able to see the principal stages of the manufacture of "Ironclad" incandescent gas-mantles. Three machines show how the Ramie yarn is knitted into a circular fabric, the unpregnated stockings made up into either upright or inverted soft mantles, and the upright and inverted mantles shaped and seasoned by means of compressed gas. The methods of testing the finished mantles for strength and maintenance of shape are fully demonstrated. Thus one sees, as far as can be showu with safety, the manufacture of the gas-mantle from the raw materials and original chemicals to the finished product.

Gas Fittings, Pendants, and Burners.

On a comprehensive stand shared jointly by Messrs. Sperryn & Co., Charles Joyner & Co., and Ingram & Kemp, of Birmingham, gas lighting fittings, inverted gas-burners, &c., and pendants and brackets are shown in great variety. It is the wide selection afforded here that will appeal. The Joyner gas-controller for street lighting is featured. Another interesting exhibit on this stand is a swinging bowl pendant, which enables the mantle and burner to be in clear view when lighting the gas. The old difficulty is avoided of reaching a gas-tap fixed over the burner, with the obvious risk of doing mischief to the mantle.

Magnesia clay articles of every description for the gas lighting and heating trade are shown by Messrs. M. Howlett & Co., Ltd. These include incandescent burner nozzles, bye-pass taps, gas-fire discs or nipples, mantle rings, Howlett patent mantle rods, &c. The "Howlett" incandescent gas-burners are also exhibited; also brass fittings for gas cookers, fires and stoves, lever cocks, and adapters for gas.

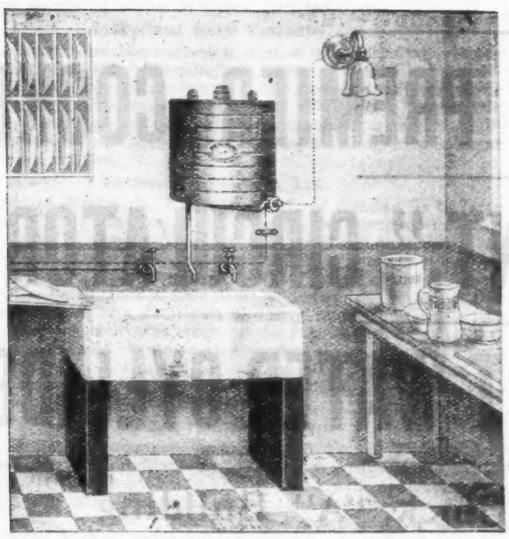
Neville's patent lift-off burners are shown on the stand of the Pneumatic Gas Lighting Company, Ltd. The burner has many advantages over the ordinary burner, not the least of which is that it can be lifted off to clean and remantle, or it may be transferred to another fitting. Another advantage of the burner is that it swings about and so takes-up vibration.

Lighting, Limited, show high-pressure and low-pressure lighting, and their "Solar" system of H.P. installation.

Thermal Light Syndicate.

The display of the Thermal Light Syndicate is interesting. The firm shows the Vitreosil gas globe, which is made from a quartz imported from Madagascar, and which, while fusing into a translucent material very similar to glass, will not break from heat. It represents

Richmond's "Lyn" Boiler.



Hot Water Supply.

An ideal apparatus for new houses, specially suitable for fitting over wash-up sinks or lavatory basin where a moderate supply of hot water is required for general domestic use. Patent thermostat reduces gas when water is hot and raises gas when water is drawn off. No attention is required, the boiler is always full of water, it is only necessary to turn on the water tap, every other working part is automatic. Constructed of stout copper and supplied in four sizes of from 2 to 6 gallons capacity.

Supplies of the special "Lyn" Folder No. 2247 are now available for distribution to consumers.

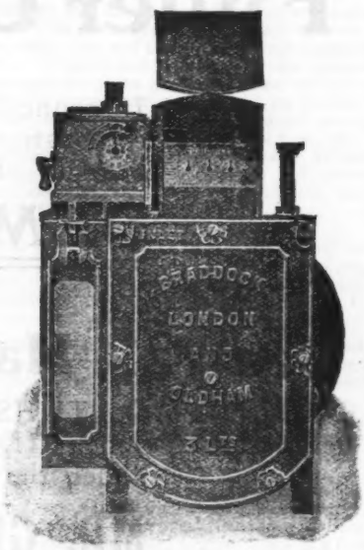
All visitors to the British Industries Fair, Birmingham, are invited to inspect the comprehensive display of "Richmond" equipment for industrial and domestic requirements at STAND No. 30.

THE RICHMOND GAS STOVE & METER CO., Ltd.,
Academy Street, Warrington. 164-172, Queen Victoria Street, E.C. 4.

BRADDOCK'S PATENT "SLOT" METERS.

No. 261. Dry "Slot" Meter.

THE BEST SLOTS MADE.



No. 265. Wet "Slot" Meter.

J. & J. BRADDOCK (BRANCH OF METERS LIMITED), Globe Meter Works, **OLDHAM.**

Telegrams—"BRADDOCK, OLDHAM." National Telephone No. 815.

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THE "95 PER CENT." CIRCULATOR

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Fuller Utilisation of Fuel.

In connection with basic and fundamental facts of combustion which are of National importance, a series of

DEMONSTRATIONS

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MR. GEORGE HELPS, Nuneaton

Supported by the Chairman (Alderman Herbert Wilde, J.P.) and Gas Committee of the Oldham Corporation, and by other industrial undertakings and fuel users.

Demonstrations—Morning 10-45 to 12-45; Afternoon 2-45 to 4-45, each day.

ADMISSION BY TICKET.—Apply to Mr. GEORGE HELPS, c/o Pleno, Ltd., NORWICH HOUSE, Southampton St., London, W.C. 1.

an advance in protectors on gas-burners as compared with the use of glass. Frequently when a mantle becomes broken the flame impinges on the glass ware; and both mantle and glass ware are ruined. With the Vitreosil globe, no damage is caused to the chimney when the mantle is broken; and it may be used continuously at the wish of the user. Again, the gas industry has hitherto not been able to develop a semi-indirect form of lighting chiefly owing to the fact that the alabaster bowls break under the heat of the gas-burner unless the gas-burner is placed some 6 or 7 inches away, in which case the effect of the lighting is considerably reduced. With the Vitreosil globe, gas-burners may be placed as near as ½-inch from the bowl.

Sutherland Meter Company.

A stand of considerable interest is that of the Sutherland Meter Company, Ltd., of Witton, Birmingham. One of the chief features, of course, is that of gas-meters (wet and dry), some on the prepayment system—the latter fitted with change lever. The "Rota" controller for street lighting is given a place of distinction; and attractive facilities are offered for street lighting installations, including lamp columns and clockwork lighters.

Messrs. R. & A Main, Ltd.

The stand of Messrs. R. & A. Main, Ltd., of London, is of large dimensions. Their gas-fires afford considerable selection, and new features are to be noted. The Company point out that many far-reaching improvements in gas-fire construction under serious consideration are not yet completed. The "Gothic" series of three fires is new; each fire being made in four sizes. The fuel is of the short type throughout. There is a daintiness of design about their fires—particularly those for bedrooms, such as the "St. Nicholas." Another feature is the "Mecca" grate—a combination range and open hearth fire. It possesses the features of the coal-range, with cooking and hot-water facilities. Gas-heated steam radiators, and circulating water-heaters deservedly attract attention.

Cannon Iron Foundries.

The "Cannon" gas-cookers, manufactured by the Cannon Iron Foundries, Ltd., Bilston, Staffs, are to be seen in great variety. Prominent is the "County" cooker, which is fitted with enamelled oven linings and with lifting hot plate, and a number of cookers of handy size, for which demand by municipalities grows. Among gas-fires, the popularity of the "Pansy" is maintained. It is fitted with improved air and gas regulator and interchangeable parts.

Davis Gas Stove Company, Ltd.

The Davis Gas-Stove Company, of London and Luton, show a variety of the latest and most scientifically designed gas apparatus, which includes a gas interior, by the adoption of which it is urged that National housing costs may be reduced through the use of small gas-flues instead of brick-built chimneys. To this, reference is implied in our introduction.

Other Exhibits.

Space forbids further detailed references, but it may be well to point out that other exhibits, having an interest of their own, are made by the following: Messrs. Bulpitt and Sons, of Birmingham, fittings and gas-lamps; Messrs. Parker, Winder, and Achurch, of Birmingham, with a variety of ranges and hearth grates; the Beeston Foundry Company, of Beeston, with stoves, ranges, and grates.

Specialities in regard to gas water heating are introduced by the Falkirk Iron Company, Ltd., of London. These include the twin system giving facilities for cooking and hot water, and prominence is given to the portable "Lawson" gas-heater for which the claim is made that it is free from odour.

The Welsbach Light Company, Ltd., of London, display incandescent gas-mantles, and radiators; Messrs. Best and Lloyd, of Birmingham, ornamental fittings for gas lighting; the Etna Lighting and Heating Company, various examples of installation work.

Messrs. Thomas Glover and Co., Ltd., of London, have a display of coin-in-the-slot meters, as well as test holders, pressure gauges, and mantle testers. Messrs. Joseph Breeden and Co., of Birmingham, show a wide selection of fittings, and incandescent gas-lamps. Messrs. A. E. Podmore and Co., of London, exhibit intensive incandescent gas-burner lamps. Gas-burners in great variety, as well as attractive art metal work in fittings are to be seen at the stand of Burners, Ltd.

Messrs. Fletcher, Russell, and Co., Ltd., show cooking, heating, laboratory, and workshop appliances; Messrs. Thomas R. Carpenter, Ltd., of Birmingham, gas-fittings; Messrs. Howlett and Co., of Birmingham, magnesia clay articles for gas lighting and kindred trades.

Messrs. Wilsons and Mathiesons, Ltd., have a display of cooking-stoves, including the "Advance," with 16 distinct and novel devices; also the "Sola" series of gas-fires, which are thoroughly scientific, including the "Sunbeam" gas-fire—a novel and unique design having a coal fire appearance. There is also a display of "Wilson" gas hot water apparatus, grillers, hot-plates, boiling burners, gas irons, and gas water-boilers. Messrs. Smith and Davis, of Birmingham, show small wares for the gas-fitting trades.

The advantages of cooking simplified by the "duck" oven are well brought out by Messrs. J. Glover & Sons, Ltd., who display many of these compact little contrivances.

The Monometer Manufacturing Company (1918), Ltd., show their patent oil and gas-fired lip axis (and central) tilting furnaces for melting brass, copper, and steel; patent aluminium iron pot melting furnaces, tilting and stationary type; patent printers' type melting furnaces, automatically heat controlled; patent automatic self-acting heat controllers; and patent oil and gas burners.

Messrs. Stewarts and Lloyds, Ltd., have a comprehensive exhibit of solid drawn and lap-welded steel pipes for all purposes, also patent long sleeve welded joints for gas-mains.

Fire-brick materials for gas manufacture, &c., are shown by Messrs. E. J. & J. Pearson, Ltd.

Messrs. Morris and Wilkinson, Ltd., exhibit all kinds of household utensils for the purposes of cooking and cleaning. Two of the main features of the firm's exhibit are the "Beatall" gas-oven and the "Beatall" dolly tub.

The Audley Engineering Company, Ltd., have an exhibit of cast-iron cocks, valves, and fittings.

BIRMINGHAM GAS CHARGES.

The Birmingham Gas Committee will present a report to the City Council to-day, in the course of which they say that they regret it is again necessary to ask the Council to sanction an increase in the charges for gas. This is rendered necessary by (*a*) the advance of 5s. per week in wages of workmen recently awarded by an Industrial Court of Arbitration, which will involve the department in an additional cost of £40,000 per annum, and (*b*) the increased railway rates, which, on coal alone, on a conservative estimate, will cost the department an additional £50,000 a year. All other materials purchased by the department are being advanced to an extent corresponding to the advance in railway rates. To fully cover these increased charges, an advance of 3d. per 1000 c.ft. would probably be required; but in view of the fact that the maximum price chargeable by the Corporation under their Statutes is 4s., and the present highest price amounts to 3s. 10d., the Committee recommend that the gas prices be increased by only 2d. at the present time (this increase to take effect as from the March reading of the meters), to consumers through ordinary meters, and that an application be made to the Ministry of Health for an increase in the maximum price chargeable from 4s. to 5s. per 1000 c.ft. The Committee do not propose to increase the price to automatic consumers at the present time.

The rebate to be given to domestic consumers during the present quarter is 6d. per 1000 c.ft.

BELFAST GAS UNDERTAKING.

Surplus Gas Profits in Relief of the Rates.

At a special meeting of the Belfast Corporation, Mr. Workman proposed the confirmation of the Gas Committee minute allocating £11,400 from the gas profits of the ensuing year to meet interest and sinking fund on the cost of the new City Hall—an allocation which has been made annually since the annual charge for the hall became due.

Messrs. Campbell and Baines protested against the allocation of money from the gas undertaking in relief of rates; the latter arguing that the users of gas supplied through automatic meters were being unfairly dealt with in the gas prices. Any profits made by the concern ought to go to the relief of the consumers. Alderman Kyle said all the Labour members were pledged to protest against money going to relief of rates from profits made by municipal trading. The legitimate object of this trading was to supply the public at the lowest possible cost and in the most effective manner, and not to pile-up profits. The Lord Mayor pointed out that gas consumers through slot meters were getting concessions beyond those given to ordinary consumers. At present they were actually getting their gas at cost price, taking into consideration the increased cost associated with auto-meter consumption. Alderman Boyd believed the slot-meter consumers were the worst treated customers of the Gas Committee; but he would not oppose the allocation.

The Lord Mayor ruled out of order an amendment by Mr. J. A. Kennedy declining to make the allocation; and an amendment by Mr. Savage, that the matter be referred back to the Gas Committee, was rejected by 28 votes to 15.

Sir James Johnston pointed out that they pledged the whole credit of the city in order to establish these undertakings; and the responsibility for loans for gas, electricity, and tramways was not confined to the users of these services. A great deal of the money was borrowed at 3½ p.ct., and a large proportion of the gas-works loans had been repaid, which, with economical management, accounted for the favourable position of the undertaking. The Act of Parliament provided that in any year when the price of gas did not exceed 3s. 9d. per 1000 c.ft. surplus profits might be applied in relief of rates. Alderman Kyle remarked that the price of gas during the year had exceeded 3s. 9d. per 1000 c.ft., and that the Act gave the Corporation merely liberty of choice in making an allocation.

The minutes were then confirmed.

On consideration of the estimates for the coming year, involving a total expenditure of £1,032,146, representing an increase of £204,472 on the last financial year, the Lord Mayor said the amount for gas for street lighting was set down at £5700.

Sale of Gas at Romford.—An increase of 18·18 p.ct. in the sale of gas during the past six months as compared with the corresponding period of 1918 was reported at the half-yearly meeting of the Romford Gas and Coke Company, Ltd. Out of a net balance of £7225, the Directors recommended for the half year dividends, less income-tax, of 5⅛ p.ct. on the original shares and 4 p.ct. on the "B" shares—leaving £4818 to be carried forward. Owing to the increased cost of coal, the price of gas was advanced by 4d. per 1000 c.ft. as from July 30; and in view of the new railway rates, which will impose an increase of 2s. per ton on the cost of coal, and a further advance of 5s. per week, *plus* 12½ p.ct., to the employees, coupled with 35 p.ct. advance in the price of oil, the Directors have been compelled to give notice of a further advance of 4d. as from Feb. 1.

Wellington (Salop) Gas Company.—The annual meeting of the Company was presided over by Mr. C. W. Leake. The statement of accounts for the year ended Dec. 31 showed that the revenue was £17,722, and the expenditure £14,946, leaving a surplus of £2776. It was proposed to declare a dividend making 5 p.ct. for the year. The Directors were confident the proprietors would view with satisfaction the fact that the Company had been able to supply gas at the standard price of 3s. 9d. per 1000 c.ft. and to declare the standard dividend. The Chairman said that, compared with the year 1918, the balance of profit showed an increase of £217. The price at which they were now selling gas was among the cheapest in the country. In the profit and loss account, there was now a credit balance of £4459, subject only to one half-year's dividend, or a net balance of £3444. As it was extremely likely that new plant would be necessary in the near future, this balance would prove very useful

NEWCASTLE-UPON-TYNE AND GATESHEAD GAS COMPANY.

The Annual Meeting of the Company was held last Tuesday, at the Offices, Grainger Street West, Newcastle—Mr. JOHN E. COWEN in the chair.

The SECRETARY (Mr. T. P. Ridley) read the notice convening the meeting.

The CHAIRMAN, moving the adoption of the report and accounts for the year ended Dec. 31, said that on the revenue side of the accounts there were only two items which need be mentioned—gas and coke. The receipts from gas were £35,000 less than in 1918. The sales, however, were 7½ p.ct. more than the last pre-war year, and showed signs of increasing. The demand for appliances was great; and it was difficult to get deliveries to meet requirements. There were only about 50 p.ct. of the total number of the public lamps at present in lighting; but by next winter it was expected that all the lamps would be lighted. They had realized over £100,000 more than last year for coke, by reason of the high prices obtained for export, which had enabled them to continue throughout the year without any increase in the price of gas, in spite of the rise of 6s. per ton in coal prices from July last. Dealing with the expenditure, he said that, owing to the carbonization of less coal and oil, and the rebate of 10s. per ton on a portion of the coals, there had been a reduction of £17,000 under this heading. Wages and salaries cost in 1913, £153,000, whereas last year they totalled £322,000. Repairs of works showed an increase of £20,000, due to higher costs of labour and materials; and a further £30,000 was set aside to meet repairs contracted to be carried out in 1920, which could not be executed earlier owing to conditions brought about by the war. A sum of £20,000 had been accumulated in previous years for the same purpose; and it was estimated that both sums would be required this year. They were carrying out extensive repairs to a large retort-house at the Redheugh works, and expected thereby to get better yields of gas and residuals per ton of coal carbonized.

REBATE IN COAL PRICES.

In December the Government decided to make a rebate of 10s. per ton of coal used for domestic purposes. Gas companies also obtained this concession in respect of coal used for supplying gas for domestic purposes; but they only received the rebate in order to pass it on to the domestic consumers. All that the companies received they had to pay away with the exception of 5 p.ct. towards the cost of distributing the rebate, which would entail a great deal of work and many difficulties. During the current quarter the rebate which would be allowed by the Company to domestic consumers would be 10d. per 1000 c.ft.; and it might be that this amount would require to be varied from time to time. One would have thought that the Government, in deciding that gas companies were to make these rebates to consumers, would have allowed this to be taken into consideration with regard to dividends under the sliding scale. But it was not so. By far the larger proportion of gas was sold for domestic purposes; yet the price for the smaller proportion for industrial purposes had to regulate dividends.

FINANCIAL HARDSHIPS.

The dividends of most gas companies were regulated by a sliding-scale, under which the lower the price of gas the higher the rate of dividend payable. In their case, for every penny charged below 2s. 9d. they could pay 2s. 6d. p.ct. dividend above their standard rate of 3½ p.ct. Immediately before the war they were paying 4½ p.ct. The sliding-scale was introduced over forty years ago with a view to giving an incentive to good management, whereby gas might be sold to the public as cheaply as possible. Prior to the war the arrangement worked very well; but war conditions—which were never contemplated when the sliding-scale was introduced—sent costs up enormously; the price of gas rose; the dividends had to be reduced; and all the benefits attained by good management in the past were swept away. The gas companies in 1918 applied to Parliament for matters to be remedied; and a Select Committee was appointed to hear evidence. This they did, and reported to the effect that the gas companies had made out their case. But the relief they suggested was altogether inadequate. The result was the passing of the Temporary Increase of Charges Act, which allowed gas companies, upon receiving the sanction of the Board of Trade, to charge such prices for gas as would enable them to pay three-quarters of their standard or of their pre-war dividend, whichever was the lower. This Company, fortunately, had not found it necessary to make application to the Board of Trade, as they had been able to get along with a charge for gas which allowed them to pay their standard dividend of £3 10s. It had been suggested by some that the 3½ p.ct. really represented 7 p.ct. dividend, owing to the conversion of stock eighteen years ago. This was not correct. The stock having been sold by auction at large premiums, the present yield upon the total money actually paid to the Company by the investing public for ordinary stock during the last thirty years was only £3 7s. 4d. p.ct. Inasmuch as out of 2600 holdings of ordinary stock there were 800 which did not exceed £100 each, and 1000 more between £100 and £500, it would be seen how very hardly the present position pressed upon small investors. When they issued stock in February, 1914, they did their best to persuade the small investors among their own consumers to buy—fully expecting to maintain, if not to increase, the dividends then ruling. But the unfair conditions now operating on gas companies had reduced the dividends and also reduced (which was even more important) the value of the principal from £100 to about £65. The Government had promised to introduce this session a Public Bill with a view to relieving the financial position of gas undertakings. When the Bill was introduced he hoped all shareholders, and not only shareholders but also the employees, would use all the influence they possessed in seeing that justice was done to an industry which was among the most important in the country and which affected the country's welfare and home life so materially. There must be fair remuneration for capital, just as there must be fair wages to employees and fair prices to consumers. If this was not brought about shortly in the gas industry it could not possibly prosper; and this would eventually be to the detriment of both the consumers and employees. He trusted that local authorities would view the matter in this light, and do what they could to assist legislation introduced to obtain fair treatment for the only industry whose dividend was directly regulated by the price charged for the commodity supplied—*i.e.*, the shareholder could only benefit when the consumer had benefited to a greater extent.

THE BEILBY REPORT.

At the same time as financial legislation was introduced provision was to be made for selling gas on a new basis—by heat units instead of by volume. In these days the heating value of gas was of infinitely greater importance than the illuminating value, which latter was the standard for flat-flame burners, whereas incandescent lighting and all the other purposes for which gas was used required heating value. On the new basis, consumers would only pay for the number of heat units supplied.

THE FUTURE.

So far as the sale of gas was concerned, the future was bright and full of hope. It was their purpose to give the consumers the best of service in all directions, as a satisfied consumer was the best possible advertisement. He was certain they had a big future before them—subject to there being a rectification of the present unfair financial position of those who had provided the money for the business.

The report was adopted; and a resolution was passed that dividends for the half year ended Dec. 31 be paid at the rate of 4 p.ct. on the preference stock and 3½ p.ct. on the ordinary stock.

WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS COMPANY.

The Half-Yearly Meeting of the Company was held last Tuesday, at the Cannon Street Hotel, E.C., Mr. H. E. JONES in the chair.

The CHAIRMAN read the notice convening the meeting, remarking, as a preliminary, that he was in an embarrassing position by having to be Secretary as well as Chairman. Their Secretary (Mr. Charles W. Braine), he regretted to say, was a little indisposed; and it was thought better he should not come out on this occasion.

The Directors' report and the statement of accounts were taken as read.

INCREASING SERVICE USE OF GAS AS A FUEL.

The CHAIRMAN, in moving the adoption of the report and accounts, said the proprietors would in the first place see from the report that the business was booming. They had had the largest increase in the sale of gas that had perhaps been recorded in the Company's career—17 6 p.ct.—proving that the demand for gas, for fuel purposes more especially (which was their great function to-day) was continuing undiminished by the high price they were compelled to charge in the iniquitous circumstances in which the Company were placed, and which reduced the dividend every time the price was raised, though these circumstances were not under the control of the Directors. Undismayed by the price, and the rather worse quality of the gas (which would be better if the Government would only let them have coal instead of dirt), there was still a boom in gas. There never was a time within his own purview of many gas companies in all parts of the world (for he had association with them in South America, India, and France, as well as this country), that proved, as this time did, the essential value to the householder of gas as a fuel. Of course, this was helped at the moment by the difficulty and the dearness of transport. When they came to deal with a heavy solid fuel like coal, made heavier by containing something like 20 p.ct. of rock, stone, and sand, and when they considered the difficulties of distributing this fuel, they would realize what value and advantage there were in the facility of being able to turn a tap, and obtain a good supply of fuel. When it was realized that they could not get domestic servants for love or money, and if they did obtain them they did not do much, the immense value of a gas-fire or a gas-cooking-stove to a householder was seen to be a great boom.

THE CRUSHING BURDEN OF COAL.

There never was a better prospect for the gas industry than there was now. The proprietors would then ask him, "Why?" There never was a time when such miserable dividends were paid on the money the proprietors had put down to produce this effect as those they would be that day authorizing the Board to pay them. They would ask him, how this had come about, and why it was necessary to raise the price of gas 6d. per 1000 c.ft. in the present half year, which would make the dividend diminish by six half crowns per cent.? He would tell them why. They were being provided with the coal, which was essential for gas making, by the Government, who appointed a Coal Controller. This gentleman the second year of the war plumped on to the price of coal successively 1s. 6d. and 2s. 6d. per ton, and further difficulties followed, which all incidentally put a large sum into the excess profits tax, which went to the Treasury. But the Coal Controller had never asked the gas companies what would be the effect of these increases of 1s. 6d. and 2s. 6d. on their unfortunate business and dividend on their capital. Of course, they had to raise the price of gas, and *pro tanto* to diminish the dividend paid. Then, as the war went on, the Coal Controller shuffled coals about. In his (the Chairman's) opinion, he was a bit of a crank in regard to wagon mileage; and he set about trying to save coals a few miles of carriage. The result was that he sent to those who wanted the best sort of coal the worst sort, though they were willing to pay for the best sort, and those for whom a poorer quality would do had the best kinds. Anything that could be done was done to suit this peculiar crank; and incidentally there was the damage to the gas industry. Then last July they got a sudden notice that everyone would have to pay, dating back to a previous time, an extra 6s. per ton for coal. This was supposed to be necessary for meeting the bare cost of getting the coal. Owing to the disputes between the Government and the people working the mines, it was discovered that this was really all a blunder. When

the Directors had made up their minds that the Company would have to charge 6d. extra for gas, there came the notification that it had been found to be a great mistake, and that the Government would be able to give the people 10s. reduction per ton of coal used domestically, but not industrially. There would have been some sense if the Government had made a reduction for industrial purposes—sense for the gas and other industries of the country who employed labour. But the voters who are the domestic people were to have the reduction of 10s. per ton; and the gas undertakings were to turn coal into gas, and hand over to the consumers the whole 10s. direct. The gas companies were to have no interest in the lower price of coal. They were to hand this bonus or almsgiving on to the domestic consumer, simply deducting a small percentage to pay for the book-keeping and general proceedings of the proposition. In this way, it would be seen that gas undertakings had been made the catspaw or the sport of the coal question from start to finish. At the same time, they had paid more for labour. This he did not grudge. When men would give an honest day's work, he did not mind giving them a good fat day's pay for it. The great burden that had crushed gas companies down had been the cost of coal. They had been the sport and the toy of these Government officials. If the proprietors read the reports of meetings of such companies as the Tottenham, South Suburban, British, Winchester, and others, they would find how entirely all the calculations they could make, how all the intense study of the directors and their engineers to save and economize a few pence per 1000 c.ft., had been frustrated and overwhelmed at once by some sudden notice of a further increase in the cost of coal. No one consulted the gas companies. The men who were pitchforked into these offices, by a stroke of the pen saddled them with these obligations. After the largest rise of all, and the mistake was found out, the remedy applied was so singular or (if he might so call it) cranky, that it gave relief to the average man who did not use coal on a large scale, but to gas companies, who were large coal consumers, and who were already under heavy burdens which the Coal Control Department had put upon them, it gave no chance to even partially recover their position. Rightly utilized, the 10s. would have enabled a consumer to have had his gas 7d. or so per 1000 c ft. cheaper, and it would have enabled the Company to earn 1¼ p.ct. more. This would have been a logical, businesslike, and sensible way of doing the work. But logical business seemed to be about the last thing they got in these days from those in authority. It was bureaucracy that was grinding them down, and that was what every chairman who addressed gas shareholders had to complain of, and had to reveal. He did not know whether the proprietors read the wonderful speech that Lord Inchcape recently made to the P. and O. shareholders when he pointed out that the whole country was groaning under bureaucracy, and called attention to the mischief and evils of it.

THE COMPANY'S BILL IN PARLIAMENT—LOST FAITH.

Now he (the Chairman) had to come to another matter on which he addressed the proprietors a fortnight ago. That was their Bill in Parliament. They deposited a Bill with the idea that it would enable them the more promptly to get such financial relief as it was possible to extract from Parliament; but for the second time they were intercepted in their intention by a sort of vague promise by the head of the Board of Trade that something would be done for all gas companies *en bloc* to relieve them. The first promise of this sort turned out what some people called a "dud" or a "stunt" [Laughter]—at any rate, it proved to be a fiasco, because it resulted in a Bill getting before a Committee, two or three of the members of which represented practically the London County Council. If there was a body that set itself out to be unfair and unjust, and to oppose the gas companies, it was the London County Council. The Council were advised by very able men; and they made the most of it. This resulted in the gas companies getting from Parliament a provision that would not have done their Company any good at all, except to one section of the proprietors—the Wimbledon—who might have got a fraction more dividend if they had had three-quarters of their standard dividend. But the Act would not have helped the Wandsworth and Epsom proprietors. The relief was cut down to an unjust point through the action of the Committee. They heard the gas companies, and seemed sympathetic; and the companies thought they were going to have a reasonable dividend on their capital. But although the value of money was 6 p.ct., they were getting 3 p.ct., through the so-called "relief" being put at three-quarters of the standard or pre-war dividend whichever was the lower. Now there had been another promise, conveyed through the Governor of the largest gas company, that after Easter another measure of relief would be introduced, which it is hoped would eventuate in something just being done. If something was not done, then he saw no other course open but for gas proprietors to go and storm No. 10, Downing Street. [Laughter.] It seemed to him that, if they made some kind of demonstration—say, by putting out the gas, or going on strike—they might get something done for them. He hoped that after Easter this promised Bill would fulfil expectations; but he must say that, having watched very carefully the authorities for the past two years, personally he had not much faith in them. In lodging their own Bill, they made application to be allowed to use for gas storage some 6 acres of surplus land that they happened to hold on one of the main arteries between Wandsworth and Mitcham; and he did not much doubt that they would get the power. It would have the double effect of making use of land which would otherwise be sold. It was originally purchased because it was cheaper to buy a large piece than a small piece for rehousing some people displaced at Wandsworth; but they had been rehoused so far as the authorities were able to say was necessary. The storage scheme was being opposed; and all sorts of things were being said about the Company. There was no intention to build there great sky-scraping gasholders. They simply meant to construct distributing reservoirs of moderate height; and the Directors were considering whether they (or somebody else) might not be able to build some more houses there in front of the holders, and then people would not see them at all. There was presumably a grievance which would disappear when the Parliamentary Committee saw a model or plan, and appreciated what the proposition really was. If the Company did not do this, they would have—in spite of the higher cost of money (6 p.ct.), in spite of the fact that main pipes cost three or four times what they did before the war—to lay larger pipes, because in their desire to be conciliatory and to be subservient to the public needs, they entered into an obligation to supply gas at a pressure four times greater than ever before, and, in his opinion, twice as great as was necessary. This would involve a large expenditure in cast-iron pipes—needing a large amount of capital and interest, and a higher price for gas than if they were allowed to carry out their own plans.

A FIRM BELIEVER IN THE SLIDING-SCALE.

They were perhaps self-assured enough to know what was best for a cheap supply of gas, because their interests lay with the sliding-scale. He was as firm a believer as ever in the sliding-scale; and the cheaper they sold gas, the better for the proprietors. The sliding-scale had not broken-down in the least; and he viewed with astonishment the statements of different gas directors who had spoken of it as having broken-down. It had not done so; and the machine was as good and as perfect as ever it was. The foundation it rested upon was the experience of the previous thirty or forty years, with something like a reasonable price for coal and labour. The foundation, however, had slipped-away. The war had had the effect of destroying a good many foundations, among them that of the sliding-scale. When they got it on to a better foundation, it would inure to the prosperity of the Company as it ever did.

UNREASONABLY LOW DIVIDENDS.

The revenue account showed a balance, out of which they were only able to recommend the payment of £5 10s. p.ct. on the Wandsworth "A" stock, which was a very small amount of stock indeed. It was capital raised seventy years ago when things were totally different. They proposed £4 on the Wandsworth "B" stock and £3 17s. p.ct. on the "C" stock, £3 7s. 6d. p.ct. on the Wimbledon stock, £4 p.ct. on the Epsom stock, and £3 17s. p.ct. on the new ordinary stock. In ordinary times after a war, £3 17s. p.ct. (which was the lowest dividend except for the Wimbledon stock), they would say, was not a very bad dividend. But it was a bad dividend, as everybody, of course, knew that the £3 17s. would only purchase about 30s. worth of goods when they came to spend it, and especially when income-tax to the extent of 4s. or 6s. in the pound (as the case might be) came to be taken from it. It was not fair, it was not enough, it was not a reasonable dividend, nor was it commonsense that such a dividend should be paid. As the Chairman of the Commercial Gas Company remarked the other day, it meant a very small saving to the consumer of gas to deny stockholders the extra 2 p.ct. they ought to have—at present for a temporary purpose; but it meant permanently dearer gas, if they had to go on raising 6 p.ct. debenture capital. Recently he noticed that £20,000 of debenture stock was offered by one gas company, and only £300 was subscribed, even at 6 p.ct. This would show what the real value of money was to-day. These dividends, under war circumstances, would have been fair; but they were unfair now, and were only about half what they ought to be allowed to divide. The proprietors must enlighten their members of Parliament on this matter, and must hammer into them the crying injustice under which they were labouring—an injustice which they would not have suffered had they been more avaricious, and followed the example of the profiteering gentlemen who were rolling about full of riches and titles—men who had gained millions in supplying shells, guns, and other things. They profiteered to some tune. It was all very well to prosecute the humble grocer who overcharged someone for a pound of tea; they should prosecute the men who made their millions during the war.

THE TIME TO HAVE MADE A BARGAIN.

Gas companies ought to have seen to this at the time they were furnishing the Government with the essentials to win the war. They were told by the highest authority in the country—the highest as lawyer and chemist—that the war could not have been won without the materials the gas industry furnished for high explosives. The Government did not ask the gas industry for these high explosives until they discovered that the Germans were using them; and the request for the materials was not made until nine months after the war had commenced. The gas companies forgot to stipulate like the fat gentleman in the Midlands, with his iron-works did, that the Government should pay the price of blood for this stuff. The Company placed at the disposal of the Government their plant, their wharves and works, and they also lent them their Chief Engineer (Mr. H. O. Carr), who ruined his health while supervising the work of the southern gas companies in furnishing the Government with "T.N.T." Before they did all this, they ought to have driven their bargain. Like the big chemical manufacturers (some of them were in Parliament now), they should have seen that the national emergency and danger was an occasion for bringing them in a fat profit. Gas companies missed their chance because they were patriotic and not avaricious.

MR. CARR'S PATRIOTISM AND ILL-HEALTH.

Their late Chief Engineer was patriotic. He worked till ten and eleven o'clock at night looking up papers and figures, and travelling through the counties in his motor car, with his chemist, visiting the various gas-works. He wore himself out in the service of the country; and the Directors had had to pension him, because he was unable to face the great wear and tear, and the great anxiety, of continuing the management of a gas-works, with a Government in power that gave them such coals, and encouraged such demands on the part of labour. The country owed Mr. Carr a great debt apart from the special work that he did; and their reward was that they were able to pay a dividend of 3 p.ct. He (the Chairman) could not help saying to Sir Albert Stanley (as he then was), when he informed them that three quarters of the standard dividend was the vote of the House of Commons: "We asked you for bread, and you have given us a stone." He (the Chairman) did not want to get too controversial or too excited; but this made his blood boil. What were they to do to put the dividends on a proper basis? He had a few gas shares himself; and the present conditions hit him very hard. It seemed to him that they would have to do something with more violence, or indulge in more straight talking than they had as yet done, in order to secure justice

SAVING THROUGH FORESIGHT.

Then they came to the accounts; and here he should again have

refer to Mr. Carr. He (the Chairman) had shown that the business had increased by 17·6 p.ct., which was roughly one-sixth. The capital account, which stood at £1,082,969, had only been added to by £24,646. This was one-fortieth part, and not one-sixth part; so that the Directors had been spending wisely and well. The chief part of this sum was expended on buildings—mainly a retort-house, the construction of which, largely owing to Mr. Carr's prescience, and his pressure on and advice to himself, was pursued during the war in order to provide extra gas. Mr. Carr urged this even after the war had commenced, right on to the second year, and before prices had mounted to the terrible figures of to-day. Although it cost four times as much now for work of this class as it did before the war, the house had cost them but little more than it did before the war—at any rate, it had cost nothing like war prices. It was one of the wisest moves they ever made; and they had now one of the finest retort-houses in England, much less in London, situated on a fine wharf at Wandsworth, with good provision for handling coal. Mr. Carr would not rest until this was done. He also worried the Shipping Controller almost to death, until he got the Company another ship; and this had been saving the Company a lot of money. As the proprietors knew, the Company were supplying gas at the date of this account at 1s. per 1000 c.ft. less than almost all their big neighbours, and at 1s. 6d. lower than one or two other companies round London. They were doing this largely owing to the good management and administration which Mr. Carr gave them for so many years. He hoped that before the proprietors left they would express with him their regret that Mr. Carr had unfortunately had to be pensioned, instead of pursuing his profession, which at his age he had a right to look forward to doing with profit and reputation for himself.

THE NEW CHIEF ENGINEER.

As to the general charges in the accounts, comparisons were absolutely hopeless. When the price of coal jumped up 6s. without notice, and the increase was made retrospective, what was the use of comparing figures? Their Engineer and the Board might spend their time, and rack their brains most diligently, trying to discover some economy and save a ½d. or 1d. per 1000 c.ft., but down came the Coal Control Department with a demand which at one stroke meant 6d. to 1s. added to the price per 1000 c.ft. It was no use going into the figures; but this he would tell the proprietors that Mr. Carr's successor (Mr. Croft) whom they had appointed Chief Engineer, although a young man, had worked and carried the responsibility for the whole of one year, and during this time he had shown great capacity. It would therefore have been unjust to have appointed an outsider over his head. In justice to him, he (the Chairman) should say that the figures of production behind these accounts showed that the undertaking was working as well—he would not say as ever it did, because they had not had good coal; but so far as human efforts could go, so far as Mr. Croft's management could go, the Company had worked as well as ever.

THE RECENT INCREASE IN THE PRICE OF GAS.

In raising the price of gas by 6d. from the Christmas quarter, the Board issued a little circular to the consumers, in which they explained the position. This was one of the points in it:

> The Company is unable to earn an adequate dividend for its shareholders; while in a vain struggle to maintain the present low price, its reserves and balances have become depleted. Owing to the larger working capital necessary by higher costs, a very large debt has been incurred with its bankers, who now demand interest nearly double that received by the shareholders.

They did not get money from their bankers at less than 6 to 6½ p.ct.; and they already owed the bankers £290,000. It would be seen that stocks on the works, which a year ago were £90,000, were now valued at £121,000; and outstanding debts, which used to be £137,000, were now £175,000. There was an increase of about £70,000 in these two items alone as the result of higher prices.

A REGRET AND A NECESSITY.

Their most urgent and never-ceasing duty was to see that in some way they drove home to Parliament the necessity for relieving gas companies in respect of the conditions under which they were working. He was sorry that, in view of the promise of the Board of Trade that a General Bill would be brought forward, they did not put these things into their own Bill, and make a fight of it. The South Metropolitan Gas Company had had pluck enough to do this. They were going to contest the question, and try to satisfy Parliament that there was a need to alter the prevailing conditions. When that Company had driven the wedge in firm and true, it would perhaps be easier for others. He relied much more upon what that Company were doing than upon the airy promises of the gentleman who might be shortly appointed an Ambassador, head of the Fleet, or heaven knew what. [Laughter.] He (the Chairman) thought they might have relied better upon their own efforts. He was only personally sorry the Board were induced to modify their Bill. It would have been a good fighting Bill with which to demonstrate the truth of what he had been telling the proprietors. He was afraid that he had detained the proprietors at great length, and had been somewhat discursive, and very pugnacious. But he did hope the proprietors would realize that the Board felt that gas companies were under a grievous wrong, and that something must be done to relieve them, or they must take such steps as would satisfy the authorities that they were not going to put up with this sort of thing any longer. Personally, he should like to bring an action against them for loss of profit.

The Deputy-Chairman (Mr. R. Garraway Rice) seconded the motion.

Mr. A. P. Pennell remarked that the Chairman had referred to the reduction of dividend by six half-crowns. Did this mean that the dividend would be 15s. less next half year?

The Chairman: Yes.

Mr. Pennell said he was interested in the Wimbledon stock. A year or so ago they were informed that, though the Wimbledon proprietors had got below the dividend limit, they could not benefit under the Temporary Increase of Charges Act, because this only applied to the whole of a Company's ordinary stock, and not to a part. Would the Wimbledon stockholders under the promised new General Act obtain any relief?

The Chairman replied that, if the promised Bill passed, the Wimbledon stockholders, like other stockholders, he hoped would get their pre-war dividends at the very least. In view of the diminished value of the sovereign, and the enhanced value of capital, he did not think that the pre-war dividends were sufficient. The Directors fully sympathized with the Wimbledon stockholders, who had three representatives on the Board. Their position arose from the fact that long ago Wandsworth and Epsom had a standard selling price of 4s.; while Wimbledon had a standard no higher than 3s. 2d. But at that standard price, Wimbledon could pay 5 p.ct. and Wandsworth could only pay 4 p.ct. He was just as discontented with his Wandsworth £3 17s. as the Wimbledon stockholders were with their £3 7s. 6d.

The motion was unanimously carried.

The Dividends.

Proposed by the Chairman, and seconded by the Deputy-Chairman, the dividends mentioned in the opening address were declared, less income-tax.

Re-Elections.

Moved by the Chairman, and seconded by the Deputy-Chairman, the retiring Directors (Messrs. W. G. Langlands, H. S. Freeman, and R. M. Chart were re-elected.

The retiring Auditor (Mr. E. L. Burton) was reappointed, on the motion of Mr. J. C. Potter, seconded by Mr. B. Hennell.

A Vote of Thanks.

The Chairman said they must not part without acknowledging the services of their hard-working staff. He again referred to the work of Mr. Carr both for the nation and the Company. In Mr. Braine they had a sterling servant; and in Mr. Croft an active, diligent, loyal, and competent officer. The whole of the staff and the men, he was pleased to say, were also working well. They had established works conferences with the men; and these had brought about and maintained those happy conditions which were essential to the carrying on of such an undertaking. The whole of their employees were working cheerfully and brightly. When the stockholders got relief from Parliament, he hoped for the sake of the men the profit-sharing bonus would be restored.

Mr. H. S. Freeman seconded the motion, which was heartily carried.

A Message for Mr. Carr.

Mr. Hennell said he had personally come into contact with their Engineer; and he should like to testify to the unfailing courtesy with which he always endeavoured to meet one. He was very sorry to hear the reason that his name did not appear on the half-yearly accounts. He would ask the Chairman, on behalf of the proprietors, to convey to Mr. Carr their sense of loss.

The Chairman and Directors were also thanked for their services; and the proceedings terminated.

HORNSEY GAS COMPANY.

The Half-Yearly Ordinary General Meeting of the Company was held on Friday, at No. 5, Great Winchester Street, E.C.—Mr. A. M. Paddon (the Chairman) presiding.

The Secretary (Mr. W. E. Roberts) read the notice convening the meeting; and the report and accounts were taken as read.

An Abnormal Increase in Consumption.

The Chairman, in moving the adoption of the report and accounts, said the first feature in the statement was one which must have immediately claimed the attention of the proprietors, recording, as it did, an extraordinary increase in the Company's business during the past six months, which it would be seen amounted to no less than 25 p.ct.—62½ million cubic feet—as compared with the corresponding period of the previous year. This would be a very impressive figure if it stood entirely by itself; but, of course, it was subject to the qualification that it indicated the extent to which the public availed themselves of the removal of the Government restrictions on the use of gas. This increase might be counted upon to continue to a certain extent in the current half year. This abnormal development had left its mark on the accounts throughout. The first account was the capital account, which always called for close scrutiny in these difficult times, because it was the basis upon which all subsequent accounts rested. The total capital expenditure was stated to amount to £258,875; and reducing this to its precise significance it worked out at £416 per million cubic feet of gas, a figure which it would be worth the while of the proprietors to keep in mind. On the debit side of the revenue account, they would be prepared for very important increases indeed in the items of expenditure. Coal and coke together had cost about £19,000 more. Coal had cost the Company during the half year an average price of 41s. 6d. per ton. He would just remark in passing that this was somewhat in excess of the cost of coal in the case of companies in circumstances corresponding to their own; and therefore the results shown in the accounts should be considered in conjunction with this fact. Remembering that before the war coal cost the Company some 17s. or 18s. per ton, it would be understood what this increase meant to them. The next figure of account to which he would draw their attention was that relating to carbonizing wages. Though this had increased by approximately 50 p.ct., it now stood at little over 3d. per 1000 c.ft.—to be exact, at 3·32d.; and having regard to the demands of labour which had had to be met, and the extra cost of repairs, and of the materials needed for these repairs, he was sure the proprietors would agree with him that this was a very remarkable figure. Comparisons lost their usefulness largely when made against more stabilized conditions; but they still retained some relative value, and this figure for

labour, at these times, was a wonderfully good one. Those items which went to establish the efficiency of the Company's plant had all been well maintained. There had been no sacrifice of what he might term physical efficiency in connection with any financial result which was presented to the proprietors that day. On the other side of the account, receipts from gas, stoves, and fittings had increased by £18,149; and here he would beg leave to draw attention to the fact that these results had been based on a selling price not exceeding 4s. per 1000 c.ft. In the first quarter the charge had been 3s. 4d., and in the second 4s. Now, they knew perfectly well the price of gas obtaining in connection with the large companies in the Metropolis; and the fact that they had been able to produce such a balance-sheet as this on what was still the lowest selling price in the Metropolis, was, he thought, a commendation of their figures which he could not usefully enlarge upon. Residuals had brought them in £4794 more; and the total receipts were £22,804 up. On the other hand, the expenditure was £26,603 in excess of what it was a year ago; and therefore the profits had fallen by £3799. Turning now for a moment to the profit and loss account, it would be seen that they had made a profit of £5583, which amount was supplemented by a sum of £264 interest on cash on deposit. The latter figure was a small, but at the same time a significant, one. Most companies would be very glad to see a credit in their accounts in connection with funds which they had not been compelled to employ in their business. Generally it was a totally different story; but in the case of their Company they had been able to conserve so much of the capital as to give them a small return in the way of interest, and show that they were not driven to the wall in regard to having no money with which to carry on amid the constant and perplexing changes in their business. The figures he had quoted gave them a total of £5847; whereas there was required a sum of £6066 for the purposes chargeable to these accounts. This left them with a deficit on the comparatively large figures to which he had referred, of only £219. They would agree with him that this was a satisfactory order of things. In these days it was only with the greatest difficulty that they could bring their financial results into some sort of premeditated accord with the demands made upon them during any period of administration. The changes were so frequent, so difficult to anticipate, and so often retrospective, that it was a very severe strain upon the resources of any administration to keep their finances in proper relation to events. He knew of companies who had been so unfortunate last half year in the estimates they had been compelled to form, that they had had to pass their dividend altogether. He did not say this to commend themselves, but in order to show the proprietors how very real the difficulty was to so order the accounts that one could tell with any degree of probability where one would come out at the end of the six months. They would begin six months, and then there would be a demand on behalf of labour, and they would find themselves, after having gone some way into the half year, not only without provision to meet this demand, but sometimes faced with an award going months back into the previous half year, and so they had to take a certain amount from the current half year in connection with an account that they might have legitimately considered to be closed. Then there were the very peculiar financial habits of the Government. The proprietors knew how extraordinary they were, and how even more extraordinary were the methods by which they were carried into effect. He thought they would bewilder anybody. However, the Company had come through fairly well for the time being. One other figure he would like to call attention to was in the balance-sheet, on the credit side, and told them there was on deposit and at bank a sum of £13,000 to the credit of the Company. In ordinary circumstances, this would not be very much; but in these days it was something on which they could quite honestly congratulate themselves.

AS TO THE FUTURE.

Like the Directors, of course, the proprietors were anxious about the future; but in the light of what he had just said, he could not contribute to their information in any way. All they could do in estimating the future was to realize what good points they had in their own favour in regard to this particular undertaking; and the first point, which he said he hoped they would remember, was the low capital. This was in itself an immense safeguard against disturbing elements in the future. There was another point. There had been practically no capital expenditure in the past half year; and he could give them the assurance that the Company would be able to meet very greatly enlarged demands on the part of the public without spending any big sums on the works. In other words, they possessed a complete equipment of the best possible kind. This was reassuring taken in conjunction with the low capital. Then they had a somewhat nebulous expectation, which they must not write-off altogether, that the Government would give them some relief in regard to payment of dividends, as conforming more to pre-war conditions. The justice of this was so complete, and he had so often referred to it, that he would not do so again. But they heard the Government were occupied in the preparation of a Bill to deal with the matter; and there were some reasonable grounds for believing that, with good fortune, perhaps during the current session something might be done in this direction. If so, it would be all to the good. Meanwhile, the Directors claimed the consideration of the proprietors for what they had done in adjusting the price of gas to meet the requirements of the undertaking. Really, the public had no quarrel with gas undertakings generally with regard to anything they had been called upon to bear up to the present moment. Looking at the matter broadly, coal had gone up from 150 to 180 p.ct.; labour, from 130 to 140 p.ct.; while materials had gone up so far that he could not see where they had gone to, but it was anything up to 400 p.ct. They had to meet all these things; and they had reduced their own dividends in some measure of satisfaction towards what they had asked the public to sacrifice. The gas industry had been most reasonable in its treatment of the general public.

The DEPUTY-CHAIRMAN (Mr. A. F. Phillips) seconded the resolution, which was at once carried unanimously.

The CHAIRMAN moved: "That the sum of £1645 16s., less income-tax, for the payment of the half-year's interest on £65,832 5 p.ct. preference stock to Dec. 31, 1919, be set apart, and that the same be paid accordingly; and that a dividend at the rate of 9¼ p.ct. per annum on the 10 p.ct. 'A' stock and at the rate of 6¼ p.ct. per annum on the 7 p.ct. consolidated stock for the half year ended Dec. 31, 1919, subject to income-tax, be, and is hereby, declared payable."

Mr. G. W. CAREY seconded this, and it was agreed to.

On the proposition of the CHAIRMAN, seconded by Mr. J. M. MILES, the retiring Directors (Messrs. F. H. Jones and A. F. Phillips) were re-elected—the Chairman remarking that he did not know two gentlemen who could contribute more to the prosperity of the Company than the Directors named.

The retiring Auditor (Mr. H. A. Floate) was also re-appointed on the motion of Mr. E. W. DREW, seconded by Mr. FORBES.

Mr. F. H. JONES proposed a hearty vote of thanks to the Engineer and General Manager (Mr. J. W. Buckley), the Secretary, and the other officers and staff. He said that it was a pleasure to do this, because it was thoroughly deserved. The Company was extremely well managed, and the working results were better than most. Anyone who visited Hornsey would see a works in a condition second to none. In Mr. Buckley they had an extraordinarily good manager; and he was aided by a hard-working staff, and good workmen.

Mr. MACKAY, a resident in the district, said he would like to second this, as he could speak from the consumers' point of view. They not only had the cheapest gas in the Metropolis; but if ever he wanted anything done by the Gas Company, he always got prompt attention and every courtesy from all the officials.

The vote was cordially passed, and acknowledged by Mr. BUCKLEY.

The Chairman and Directors were also thanked for their services, on the proposition of Mr. DREW, seconded by Mr. MACKAY.

SOUTH SHIELDS GAS COMPANY.

The Annual Meeting of the Company was held at South Shields last Tuesday—Mr. JAMES READHEAD presiding.

In moving the adoption of the report, the Chairman said, all things considered, they had come out as favourably as other companies in the district, and, perhaps, more favourably than those further away. They would notice that the total income amounted to over £184,000, and the expenditure to £170,000 odd—leaving a profit of £14,000. They had also for the first time complied with the requirements of the new 1919 Act, and transferred £3298 to the special purposes fund; the insurance fund having also been merged into it. During the last year coal—and, in fact, everything required for the manufacture of gas—had been going up in price; and, roughly, the increase in the materials amounted to between 100 and 300 p.ct., which gave them an idea of the difficulties of the management during the past year. With regard to meter and apparatus renewals, they had had to expend a much larger sum than usual; but this was due principally to the fact that very little had been done during the five years of war, and the consequent scarcity of labour. One of the most pleasant features in the accounts was the increase in the sale of gas of 7 p.ct. over the previous year; and they hoped that the increased sale would continue and become permanent. In June last the Directors reduced the price of gas 4d. per 1000 c.ft., which gave some relief to shareholders, and enabled them to get a more reasonable dividend. With regard to the Controller's latest directions, they had to reduce the price of gas, and they hoped to make a reduction of 6d. per 1000 c.ft., thereby giving the consumer the benefit in the reduction in the price of coal. As to the future, Parliament had almost settled upon taking up next session the unfortunate position of gas companies, due principally to the rise in materials and the cost of labour; and it was to be hoped that, if the Government brought in the Bill, it would be fair to the shareholders and the consumers. No industry had suffered more during the war than gas companies had, through no fault of their own. The shareholders could not have had such a handsome report as they had, but for the fact that exported coke had commanded such high prices. But they could not expect this to continue when things became normal. The Board had every confidence in the future of the Company; and he ventured to suggest that next year they would find the accounts more satisfactory.

The report was adopted; and it was agreed that a dividend of 3 p.ct. on the consolidated and new stock, less income-tax, be declared for the half year—making, with the interim dividend of 2½ p.ct., 5½ p.ct. for the year. It was agreed also that a dividend of 2¼ p.ct., less income-tax, for the half year on the ordinary stock be declared—making, with the interim dividend of 2 p.ct., 4¼ p ct. for the year.

An extraordinary meeting was afterwards held, at which the Directors were given power to raise a sum not exceeding £55,410, authorized to be borrowed by the Company's Act of 1919, and the Acts incorporated therewith.

Gas Lighting in North London.—Following the lead of the Southgate Urban District Council, the Edmonton Council, at a meeting last Tuesday, adpoted the following motion: "That, in view of the persistent failure of the Tottenham District Light, Heat, and Power Company to supply gas of the statutory calorific value, this Council requests the Board of Trade to require the Company, in the accounts rendered to consumers, to make a reduction in their charge corresponding to the deficiency in the calorific value supplied, as compared with the statutory standard."

Smethwick Gas Prices.—The Gas Committee of the Smethwick Corporation report that, under the Order reducing the price of domestic coal 10s. per ton, the rebate to be given to domestic consumers of gas will be at the rate of 8d. per 1000 c.ft. In the case of users of prepayment meters, an additional discount 12½ p.ct. will be allowed. The Committee, however, regret that, owing to the greatly increased working costs caused by other orders of the Government, including increased railway rates, the advance of 5s. in wages, and other obligations which it is estimated will increase the expenditure by £7225 per annum, they have no alternative but to ask that from the March quarter the price of gas be increased to all consumers by 3d. per 1000 c.ft.

BARNET DISTRICT GAS AND WATER COMPANY.

An Increase in Consumption.

The Half-Yearly Meeting of the Company was held on Monday last week, at the Offices, No. 139, Cannon Street, E.C.—Mr. A. F. PHILLIPS in the chair.

The SECRETARY (Mr. Ernest F. Drew, F.C.A.) read the notice calling the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said the capital account showed an addition of £1000 for the purchase of land adjoining the gas-works which it was considered desirable to acquire. But against this there was a credit of £952 for depreciation, leaving only £48 increase of gas capital. There was no addition to the water capital. In the corresponding previous half year there was a reduction of 18 p.ct. in gas sold, due to the Rationing Order then in force. During the past half year there had been no such restriction, and the consumption showed an increase of 29·9 p.ct.; but, of course, such an increase would not continue. It was due to the reduced consumption in 1918. To meet the addition of 6s. per ton to the cost of coal last July, the price of gas was increased 2d. per 1000 c.ft. from Michaelmas last, making the charge 4s. 6d. per 1000 c.ft. in the Barnet district, and an increase of 8d. (to 5s.) per 1000 c.ft. in the rest of the Company's area. Since then a further addition of 5s. per week in wages had been awarded to labour, and the freight on coal had been increased 2s. per ton. The Company never having paid the full dividend to which the proprietors were entitled were able to make this addition to the price of the gas without reducing the dividend; but the limit had now been reached, and the ever-increasing charges for coal and all other material required on a gas-works, with the demands of labour, caused the Directors much anxiety. It would only be by the exercise of economy and efficiency that the dividends would be maintained. As the accounts gave the figures for the corresponding previous half year, it was not necessary to go through them. The gas-rental showed an increase of £8941, due to the price having been raised, and the increased consumption. On the other side, coal and oil for gas making cost £2735 more; carbonizing wages were up £1492; and repairs of works cost £1837 more. The balance of revenue was £5749. In the water undertaking, the rental was practically the same as last year, being only £751 more; while pumping charges were £1015 more, and salaries and wages were up £430. The resulting balance of revenue was £13,083. The balance standing to the credit of profit and loss, after meeting the interest on the debenture stock and other charges, was £36,658, from which the dividends recommended would take £10,383, leaving £26,274 to carry forward. The Coal Controller had announced a rebate of 10s. per ton on all coal supplied from Dec. 1 employed in producing gas for domestic and household use, which was to be distributed among the domestic and household consumers in proportion to the gas consumed. This was a policy which would involve a considerable amount of extra work for the officials of all gas companies; but he was sure they would endeavour to loyally carry out the wishes of the Government. The amount of the rebate would vary with different companies, according to the proportion of water gas produced. The half year had been an anxious time for the Directors and the Company's officials. There had always been the danger of the works being left without coal; and the demands of labour had had to be conceded. But proprietors and the Board had much to congratulate themselves upon. All the employees had loyally served the Company; and the Directors were pleased to recognize that they were entitled to fair and adequate remuneration for their services. While the future was full of uncertainties, the Board had reason to hope that the Company's position was assured for the present. The works and plant had been well maintained, and were equal to any demands likely to be made upon them.

The DEPUTY-CHAIRMAN (Dr. J. W. L. Glaisher, F.R.S.), formally seconded the motion.

Mr. J. M. WOOD said he would like to congratulate the Directors upon what they had done for the shareholders during the past half year. He felt the Company were very fortunate indeed in having such results as the Chairman had been able to present to them that day. It was a very good thing for them, under present conditions, that they had Directors who possessed a thorough knowledge of gas and water undertakings.

The resolution was carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. COLIN DOCWRA, dividends were declared, less income-tax, for the half year, at the rates per annum of 9 p.ct. on the "A" and "C" stocks, 8 p.ct. on the "B" stock, and £6 6s. p.ct. on the "D" capital gas and water stocks.

The retiring Directors (Messrs. Samuel Cutler and Colin Docwra) were next re-elected, on the proposition of the CHAIRMAN, seconded by Mr. A. W. OKE; and the retiring Auditor (Mr. B. D. Holroyd) was re-appointed, on the motion of Mr. F. R. SMITH, seconded by Mr. W. M. BECK.

The CHAIRMAN remarked that there only remained one duty for him to perform; and it was a very pleasant one. It was to propose a hearty vote of thanks to the Company's staff and all the employees. However much the Directors might know, and however definite their instructions might be, they would be useless without the aid of competent officials to carry them out. The Company were exceedingly fortunate in having a gentleman of Mr. Drew's experience of accounts, and an engineer like Mr. Bancroft, who so thoroughly understood, and was a master of, every detail connected with the administration of gas and water works.

Mr. C. P. CROOKENDEN seconded the vote, which was cordially passed, and briefly acknowledged by Mr. DREW and Mr. BANCROFT—the latter drawing special attention to the fact that the whole of the staff and workmen were working loyally to serve the interests of the Company.

The meeting concluded with a vote of thanks to the Chairman and Directors, on the proposition of Mr. BECK, seconded by Mr. SMITH.

GAS SUPPLY IN MID LANARKSHIRE.

Further definite steps towards the municipalizing of the gas supply of the Middle Ward of Lanarkshire have now been taken. At a meeting of the Middle Ward District Committee on Friday last—Mr. Thomas Arnott presiding—the Sub-Committee appointed on the subject gave in their report. Attending the Sub-Committee's meeting, in an advisory capacity, was Mr. Doig Gibb, M.Inst.C.E. The Convener was Mr. Owen Coyle.

The Committee's minute was to the effect that the Clerk (Mr. W. E. Whyte, O.B.E.) stated that he had requested Mr. Peter Rintoul, of Glasgow, to report on the financial aspect of the proposals relative to the Cambuslang, Bellshill and Mossend, and Larkhall areas, in connection with which the District Committee had passed resolutions in December, 1914, adopting the Burghs Gas Supply (Scotland) Act, 1876, which resolutions had been duly confirmed by the County Council and ordered by the Sheriff to be recorded in the Sheriff Court books—all in terms of the statutory provisions. Mr. Rintoul's report, which was in general terms, at this stage was submitted and read; and after a full statement had been made by the Clerk on the whole situation, Mr. Doig Gibb was invited to outline the scheme which he had recommended should be adopted for the district.

Mr. Gibb made an exhaustive statement on the subject, dealing particularly with the three areas above referred to and the expediency of proceeding, as regards these areas, with the further steps contemplated by the statutes regulating the matter. Several questions were addressed to Mr. Gibb and answered by him, both on the general aspect of the District Committee becoming the undertakers for the supply of gas throughout the Middle Ward district, and on particular points of the scheme recommended by him.

The whole matter thereupon engaged the Committee's careful consideration. After discussion, the meeting was unanimously of opinion that it was both expedient and desirable, in the interests of the district as a whole, that at this stage the requisite steps should be taken to carry into effect the powers conferred by the Burghs Gas Supply (Scotland) Act, 1876, and amending Acts, as the same have been made applicable to the County of Lanark, for the areas at Cambuslang, Bellshill and Mossend, and Larkhall, all as referred to and described in resolutions adopted at special meetings of the District Committee held Dec. 11, 1914; and they agreed to recommend accordingly.

It was further agreed to recommend that the Chairman, the Clerk, and Mr. Doig Gibb should be empowered to negotiate with the gas companies concerned in the matter of the price at which their undertakings might be acquired, and otherwise to take all steps which to them might seem desirable in order to secure the carrying into effect at the earliest possible moment of the plenary powers available to the District Committee under the statutory provisions referred to.

Mr. Manus Duddy observed that the report only dealt with three districts of the Middle Ward. He inquired if it was not the intention to cover the whole Ward? The Clerk said it was with respect to three areas with regard to which a decision was come to in 1914, but which was held up on account of the war. They were now beginning at the place they left off on the former negotiations and procedure, and dealing with Cambuslang, Bellshill and Mossend, and Larkhall areas. The scheme, however, was to have a gas supply of their own for the whole Middle Ward area.

The District Committee approved of the Sub-Committee's recommendations, and left the matter of further procedure in their hands.

KILKENNY GAS-WORKS UNDERTAKING.

The Corporation and the Management.

Mr. A. D. Price, Engineering Inspector of the Local Government Board for Ireland, held an arbitration inquiry in Kilkenny into the application of the Kilkenny Gas Company and the Kilkenny Gas Lessees, Ltd., for power to increase the price charged for gas supplied to private consumers.

Mr. G. W. ANDERSON, for the Gas Lessees, referred to the wording in a clause of the lease dated Nov. 16, 1880, which stated that the price of gas should not be exceeded except by the authority of an arbitrator appointed by the Board of Trade, and only then if the price of coal and the cost of freight justified an increase.

Mr. M. BUGGY, for the Corporation, said that, according to the lease, the gas to be supplied was to be of 14-c.p., but this had not been complied with for a long time past. The Corporation had not taken advantage of the provision which entitled them to provide a testing apparatus. Even if there was an increase in the cost of coal, the supply was not of 14-c.p.; and if the controllers of the gas-works were making money otherwise out of them, they should in the ordinary way credit it to the Corporation and the consumers. By an offer of theirs some years ago, the Gas Company, on a low rate, ousted competition which had been mooted by an electric lighting company.

Mr. ANDERSON, giving evidence, said the present cost of coal delivered at the gas-works was 64s. 6d. per ton. This included railway freight and other charges. In 1886, the cost was 20s. per ton. The Corporation said that no increase was necessary; but he claimed on the figures that it was. They were protected by an Order of the Board of Trade, which prevented them supplying 14-c.p. gas. The quality they were supplying was 12-c.p. During 1918-19 10,986 c.ft. of gas was sold per ton of coal; the cost per 1000 c.ft. working out at 70·4d., or an increase of 39·4d. per 1000 c.ft. sold. The Company asked for 8s. per 1000 c.ft. from the consumers, instead of 5s. 9d. as at present. He suggested that this price be granted, subject to a reduction or increase of 3s. 4d. per 1000 c.ft. for each 1s. reduction or advance in price of coal. This price would not be subject to reduction on account of the recent 10s. reduction in the price of coal, which went as a rebate to consumers. He estimated the loss on the working to June 30 last at £270, and the loss to June next at £1993. The average profits up to 1918 were between £1000 and £1100 a year. The present loss

was estimated at 1s. 10½d. per 1000 c.ft.; and the increase required would be 3s. 2½d. The Company's total capital was £20,950. They were losing on the public lighting contract. He had no recollection of the electric lighting question entering into the contract for public lighting. If the public lighting contract were released, it might not be necessary to get such a high price for gas as he had shown. He would then be prepared to modify his demand to the extent of 8d. or 8½d. per 1000 c.ft.

Evidence was given by several local witnesses as to the bad quality of the gas; the public lighting being described as being "absolutely shocking."

Mr. *R. C. Murphy*, the Borough Surveyor, said complaints to the Company seemed to have no effect.

Mr. ANDERSON said there might have been complaints about particular lamps; but they had had no general complaint.

The INSPECTOR expressed regret that Mr. Anderson was not able to meet the Corporation by giving the necessary power in lighting.

Mr. ANDERSON replied that they had given gas as far as was in their power.

Mr. *J. Grant*, formerly Manager of the gas-works, was called. He said that the complaints arose largely from consumers themselves not paying attention to their burners. In his opinion, the Kilkenny gas was as pure as that to be obtained anywhere.

On attention being called to the failure of the gas at midnight,

Mr. ANDERSON said if a small pressure was wanted after that hour they would give it; but they presumed there was little light required after midnight.

Mr. *Grant* considered the bad street lighting was due to broken lamps and mantles.

Mr. *M. Drohan*, the present Manager of the works, said in some cases where complaints were made he found choked pipes and pipes that were too small. In the case of a complaint from the Post Office, it was found that the meter was too small.

The INSPECTOR said that a decision would be promulgated in due course.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *March* 1.

In the London market, the pitch position is most interesting. The demand for export is strongly maintained; the price being at least 110s. net per ton in bulk f.o.b. makers' works. There is also good business reported for home trade. Inquiries for tar materials for roads are still active, although many contracts have been placed already. There is no change in benzol, toluol, or solvent naphtha to report. Creosote is firm and rather scarce at 10d. to 10½d. net in bulk. Sixties crude carbolic acid remains at about 3s. 6d. net and naked.

Sulphate of ammonia for home agriculture continues on the basis of the prices officially arranged.

Tar Products in the Provinces.

March 1.

The average values for gas-works products during the week were: Gas-works coal tar, 71s. 6d. to 76s. 6d. Pitch, East Coast, 105s. to 107s. 6d. per ton f.a.s.; West Coast—Manchester, 95s. to 100s.; Liverpool, 95s. to 100s.; Clyde, 105s. to 107s. 6d. nominal. Benzol 90 p.ct., North, 2s. 3d. to 2s. 4d.; crude 65 p.ct. at 120° C., 1s. 5d. to 1s. 7d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 2d. to 2s. 4d. Toluol, naked, North, 2s. 5d. to 2s. 6d. nominal. Coal tar crude naphtha in bulk, North, 10d. to 10½d. Solvent naphtha, naked, North, 3s. 3d. to 3s. 4d. Heavy naphtha, North, 3s. 2d. to 3s. 3d. Creosote, in bulk, North, liquid, 10½d. to 10⅝d.; salty, 7d. to 7½d. Heavy oils, in bulk, North, 8½d. to 9d. Carbolic acid, 60 p.ct., 3s. 3d. to 3s. 6d. Naphthalene, £22 to £25; salts, £7 10s. to £8 10s., bags included. Anthracene, "A" quality, 7½d. to 8d. per minimum 40 p.ct.; "B" quality, nominal.

Manchester District Tar Prices.

The average price realized for tar in the Manchester district, based on the value of the products, for the month of January was £4 3s. 7d.

FROM A MARKET CORRESPONDENT.

Tar Products.

Markets are distinctly firm for all products. This feature is probably due to the continued advance in pitch. Great caution is now being displayed all round, particularly with regard to forward sales; for general experience in the past year has been that sales made one day are regretted the next. Pitch has been sold at £6 per ton, and another 10s. per ton advance would cause no surprise in some quarters. Although there is a heavy demand for everything offered, the position is irregular and definite quotations impossible to fix. Naphthas are dearer again, especially solvent; and creosote is steadily advancing. Up to 1s. per gallon is spoken of as the top of the current movement, and, as with pitch, it is difficult to fix present values. Carbolic acid is much as it was. Crystal in bulk is saleable at 1s. 2d. per lb.; but more would be asked for smaller parcels. Crude 50's were recently selling at 3s. 5d. to 3s. 6d. per gallon, and 60's from 3s. 6d. to 3s. 8d. per gallon. Naphthalenes are, if anything, rather scarcer, and crudes range from a £7 minimum to £12 per ton, according to quality. Refined is not much offered, but when available makes £25 per ton. Benzols are unchanged, although the outlook is considered fairly satisfactory. It is rumoured that exports of motor spirit from America would be compelled to cease; but although there is no authentic

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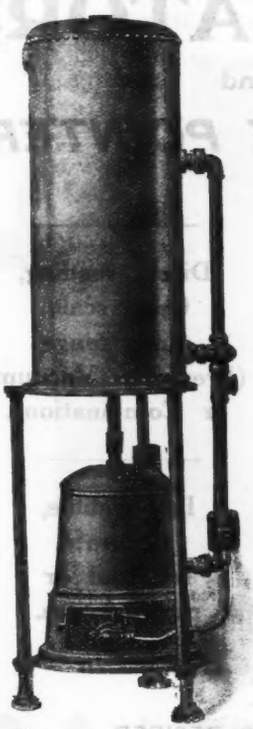

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information on this point, figures regarding consumption lend support to this view. Efforts to increase benzol production at home should be, and can be, made; and doubtless the gas-works will do their full share when they can obtain official sanction to very fair proposals. The market for intermediates remains very difficult, and there is little alteration, except that the tendency to advance is not so pronounced. Most works are well sold forward, and supplies coming to hand are only small. Aniline salts and oil are 2s. and 1s. 7d. per lb. respectively, and salicylic acid is scarce for early delivery at 3s. 3d. per lb. Other products are unchanged.

Latest quotations are as follows:

Benzol: 90% London 2s. 4d. to 2s. 5d., North 2s. 3d. to 2s. 4d.; 50-90% 2s. 2d. to 2s. 3d. London, 2s. 1d. to 2s. 2d. North; crude 60-65%, 1s. 5d. to 1s. 7d.; pure, 3s. per gallon naked.

Crude Tar: London, 62s. 6d. to 67s. 6d.; Midlands, 58s. to 65s.; North, 57s. to 62s. 6d. per ton *ex* works. Refined tar, 42s. per barrel (free) on rail.

Pitch: London, 115s. per ton; East Coast, 107s. 6d. to 112s. 6d. per ton; West Coast, 105s. to 115s., with Manchester 105s. per ton, and Glasgow 110s. per ton; South Wales, 120s. per ton.

Solvent Naphtha: London, 3s. 8d. Provinces average 3s. 5d. per gallon.

Crude Naphtha: Naked, 10d.; North, 9d. per gallon.

Heavy Naphtha: 3s. 2d. per gallon.

Naphthalene: Refined, £25 per ton nominal; crude, £7 to £12 10s., according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d. Pure, 3s.

Creosote: London, 10d.; North, 9d. to 9½d.; heavy oil, 8½d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 7d. to 1s. 8d. per lb., drums free.

Cresylic Acid: 95%, 3s. to 3s. 3d.; 97-99%, 3s. 3d. to 3s. 6d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 3s. 8d. per gallon; crystals 40%, 1s. 2d. to 1s. 3d. per lb.

Sulphate of Ammonia.

Supplies are moving off freely; the official price for this month's deliveries being £22 per ton. It is understood that the revision of home prices is under consideration. Makers think that export prices should also be raised in view of the trend of nitrate values. The foreign position, however, is still a delicate one, and exporters probably wish to re-establish their markets firmly. There are many foreign orders waiting to be filled; but the amount likely to be available for this trade is uncertain. From America, there is reported continued persistent buying for export; but this movement is limited by the supplies available. Record prices are being paid, and offerings are scarcer than for a long time past, with the general trade without quotations.

Harrogate Gas Company.

The Chairman (Mr. Francis Barber), in moving the adoption of the report and accounts at the recent meeting of the Company, said the proprietors should be congratulated on the result of the year's working, which had surpassed his expectations; the profit earned being sufficient to enable the statutory dividends to be paid. In the revenue account the increases in expenditure were almost entirely due to the advanced cost of coal and labour, and the increased prices of materials used in the repair of works and distributing plant. The cost of labour alone was 19·04d. per 1000 c.ft. sold, an increase of 10·74d. over 1913. Mains now cost three times the amount they did in pre-war years. The increased receipts were partly due to the greater demand for gas, and partly to the increase in price necessitated by the advances in the cost of coal. The present price was 4s. 2d. per 1000 c.ft. gross, or 3s. 9d. net, which was much below the five largest works of Yorkshire—Sheffield, Leeds, Bradford, Huddersfield, and Halifax. The net price to consumers for domestic and household purposes would be further reduced by 9d. per 1000 c.ft. under the Coal Prices Order; so that the net charge for domestic use would be only 3s. per 1000 c.ft., as against 4s. 2d. in Leeds. The advantages of gas as a fuel were emphasized by the demand. There being no building at the present time, the increase could only be attributed to the convenience and efficiency which gas was able to show. At the meeting in August, a resolution was moved in support of the just claims of the industry to its speedy release from those statutory ties by which its capital value was now said to have been reduced from £100,000,000 to £57,000,000. As sanctioned by the proprietors, steps were taken to promote a Private Bill to remove the difficulties under which the Company were labouring; but it transpired that the National Gas Council had, with the Board of Trade, prepared a scheme. The Board accordingly felt convinced that it would be better for them to support the general legislation of the industry than to go forward with their own Bill. Mr. G. A. Moorhouse voiced the opinion of the proprietors that the reports and accounts showed that the undertaking was managed with economy and efficiency.

Purchase of the Radcliffe and Pilkington Gas Company.—An extraordinary general meeting of shareholders in the Radcliffe and Pilkington Gas Company was held on Feb. 20 in respect of negotiations which are proceeding for the purchase of the Company's undertaking by the local authorities within the area of supply, including Radcliffe, Whitefield, Prestwich, and Little Lever. A resolution to sanction the transfer was approved. If the negotiations continue, it is proposed to form a Joint Gas Board for the area, under a parliamentary Bill. There are 3000 original 10 p.ct. shares in the Company and 9000 new ordinary shares carrying a maximum dividend of 7 p.ct., all of which are of the nominal value of £10 fully-paid. The original shareholders are offered £21 per share, and £14 14s. is offered for each of the other shares.

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Bridlington Gas Company.

The report submitted to the annual meeting of this Company—signed by the Chairman (Mr. T. D. Wentworth), and the Secretary and Manager (Mr. J. Kelly)—was a document of unusual interest. After some formal items of local interest the report proceeds: "Had the Government not increased coal by 6s. a ton in July, your Board would have endeavoured to avoid increasing the price of gas, notwithstanding large increases in cost of labour and materials. But of that occurring they were approached by the Electricity Committee of the Corporation with an invitation to avoid unfriendly competition by a joint advertisement announcing increased prices; and it was considered advisable to meet their views and advance gas to 3s. per 1000 c.ft. simultaneously with an increase in the charge for electricity. Unfortunately, this involves a reduction of 2 p.ct. in dividends under the sliding-scale in the Company's Act. The recent action of the Coal Controller in reducing the price of coal used for domestic and household purposes by 10s. per ton, however, makes the sliding-scale in many instances unworkable. Consumption has again increased by over 20 million c.ft. The balance of the year's revenue account amounts to £5519, enabling the Directors to recommend the declaration of dividends at the rate of 13s. per share on the original and 10s. per share on the additional capital, beyond the interim dividends paid for the first half of the year—making the rates for the year 14 and 11 p.ct. respectively. The works and plant have been maintained in good working order and repair.

South Wales Notices Withdrawn.—The South Wales gas-workers cancelled their fourteen-days' notices to the employers, which would have expired last Friday week. The whole of the men's demands, which affect all gas-workers in South Wales, have been referred to the National Joint Industrial Council of Gas-Workers; and, failing a settlement being arrived at, both sides have agreed to arbitration.

Whitby Gas Company.—The meeting of the Company was presided over by Mr. Richard Smailes (the Chairman), who, in moving the adoption of the accounts for the past year, said the total expenditure on revenue account showed an increase of £3472 over the preceding twelve months. The receipts, on the other hand, exhibited a most gratifying gain. They had sold 3 million c.ft. of gas more, and the amount received for gas had increased by £2500. The return from residual products constituted a record. The Directors were glad to report an increased demand for gas for lighting, heating, and cooking; and in order to meet the requirements of consumers in these directions, they had contracted for the erection of new plant of the most up-to-date character, which they hoped to have in operation in the course of two or three months. Dividends at the rate of 3 p.ct. on the original and £2 2s. p.ct. on the additional and new additional capital (both less income-tax) were declared for the past half year, making 6 p.ct. and £4 4s. p.ct. respectively for the year.

British Industrial "Safety First" Association.

The Association which was formed for the purpose of furthering the cause of accident prevention in connection with industrial occupations, has for its President the Rt. Hon. Lord Leverhulme, who is supported by an influential body of Vice-Presidents. There is also an Executive Council, made up of a number of well-known business men, including Mr. D. Milne Watson, Mr. F. W. Goodenough, and Mr. Leon Gaster. The first annual meeting was held at the Mansion House last Tuesday; and the report then submitted showed that there has been great activity on the part of the Association. There is an official organ, and much publicity work has been undertaken in other directions. There have been received and dealt with numerous applications for advice as to the prevention of particular types of accidents; information as to foreign practice and home experience having been furnished. Meetings of members' representatives have been held, at which discussions have taken place, points of practice been compared, and views exchanged. These meetings are to be made a special feature, seeing that they offer exceptional facilities for training, and for developing "safety" ideas. The report emphasized the fact that the types of accidents at any two works, even of a similar character, are not necessarily identical, nor the class of workers at each alike. The human element thus becomes an incalculable and important factor. This factor has been studied, and remedial measures devised to meet the conditions which obtain. Hence the advantage of collective comparison and the pooling of experience and information. Grades of membership have been established, with varying subscriptions; and the Association is co-operative and non-commercial—the whole of the income being expended solely in the interests of members. It is, however, felt to be desirable that the Association should have a reserve fund; "and if, by the munificence of individuals or firms who have at heart the interest and future progress of the 'Safety First' movement, such a fund could be established, the promoters would be relieved of very considerable anxiety."

Winchester Water and Gas Company.—At the half-yearly meeting, it was reported that the balance of net revenue account available for dividend was £7916; and the Directors recommended the payment for the six months of a dividend on the preference stock at the rate of 4 p.ct., and on the consolidated ordinary stock at the rate of 4½ p.ct. per annum (less income-tax). Owing to the action of the Coal Controller in compelling the Company to take the greater portion of their coal supplies by sea, instead of rail, at greatly increased cost, and also to the heavy increases in rates of wages, the Directors found it necessary to increase the price of gas at Michaelmas by 5d. and again at Christmas by 3d., making the price charged 5s. per 1000 c.ft. The Directors sought the assistance of the City Council, which was readily given, in support of their application for the restoration of the rail-borne coal; and they recorded their appreciation of the help thus given to the Company.

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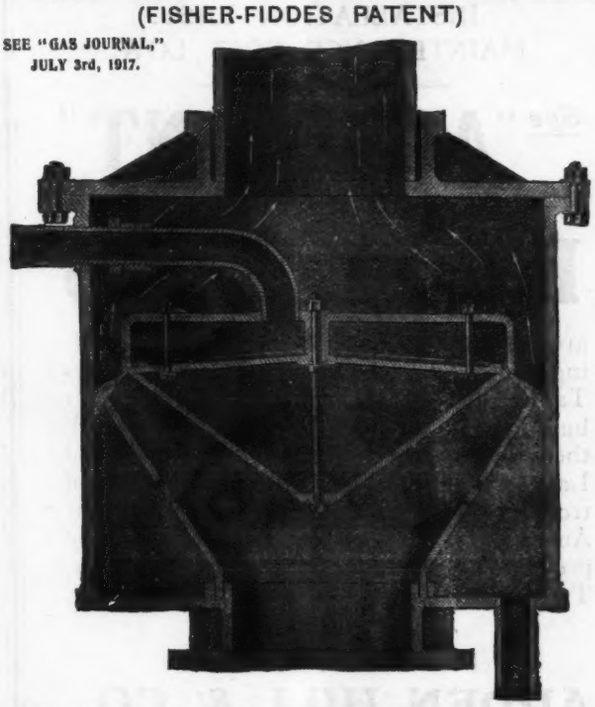

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Exeter Gas Light and Coke Company.

The Exeter Gas Company's sale of gas for the past year shows an increase of 32 million c.ft. over that of the previous year. In consequence of the large increase in the cost of coal, labour, and all materials, increases in the price of gas have been found necessary. There were two foremost items in the annual report adopted at the meeting of shareholders. It was pointed out by the Chairman (Mr. G. Hardy Harris) that up to the time of the war the sliding-scale had worked satisfactorily; but undoubtedly in the near future it would have to be amended by Parliament. The policy in Exeter had always been to keep the price of gas as low as possible, in order to increase the consumption, and to maintain a fixed rate of dividend, which had had the effect of making stable the market value of their shares. The works and manufacturing plant were all kept in good condition; and every labour-saving appliance was introduced. The Directors had been compelled to raise the price of gas to 4s. 8d. per 1000 c.ft., as compared with 2s. 4d. in 1914. Wages had, however, increased by 150 p.ct., and various materials from 150 to 200 p.ct. The Company were paying coal prices for 25 p.ct. of useless material, as well as the carriage and the cost of handling. The sale of residuals had declined; and the rate of profit on the larger turnover on gas sales did not compare favourably with previous years. The Company had to contemplate very considerable expenditure to enable them to give an efficient supply of good gas. The report and accounts were adopted; and dividends were declared at the rates of 4 p.ct. on the preference stock, 5 p.ct. on the preference shares, 7 p.ct. on the new ordinary shares, and 10 p.ct. on the original stock.

Drogheda Gas-Workers' Wages.—A special meeting of the Drogheda Corporation has again considered the gas-workers' demands for increased wages, and decided to leave the matter to arbitration. It was pointed out, however, that the financial affairs of the borough are in a critical condition, and that it would be difficult to meet any award; while there is a prospect of a heavy increase in the rates.

Dundee Gas Matters.—The question was raised at a meeting of the Dundee Gas Committee as to the correctness of gas-meters. Mr. Fletcher attributed the high consumption shown to high pressure, and to the "manner in which the gas was driven through the pipes." The Convener produced a list containing a hundred names of consumers in various parts of the city whose gas accounts for the last survey were no more, and were in some cases less, than at the previous survey. The Gas Engineer (Mr. A. Yuill) stated that there had been great difficulty in the past with the pressure. The pressure at present was sufficient to give a supply to all consumers; and if it was reduced to suit consumers with good pipes, consumers with bad pipes would get no gas at all. Following a report by the Engineer, the Convener said it was proposed that there should be a more systematic survey of the gas-fittings in the premises of consumers.

Gas Replaces Electricity in Chelmsford Streets.

A Sub-Committee of the Chelmsford Corporation report that they have conferred with representatives of the Finance and Gas-Works Committee, and discussed the question of the lighting of the streets in the north and south wards of the borough from April 1 next, and have had before them a letter from the Electric Supply Corporation, Ltd., containing the terms upon which they were prepared to enter into a new contract for the lighting of these streets, as follows: For each 500 watt (½ watt) lamp, at the rate of £25 per annum. For each incandescent lamp where there is a single lamp on a column or bracket, £5 per annum; and where there are two incandescent lamps on one standard or bracket, £7 per annum for the two. These prices were based on the assumption that the coal used for the generation of electricity for street lighting purposes would be subject to a rebate of 10s. per ton under the Coal Order; but the Town Clerk reported that electricity for street lighting could not be regarded as electricity supplied for domestic or household purposes, and therefore the above prices would have to be increased. The Company stated that the prices were quoted for a contract for five years, as they were not disposed to consider a contract for a short term; and they also stipulated that a clause should be inserted in any new contract which might be agreed to, providing for the fluctuating cost of coal and labour, whereby the Council would be required to pay increased prices in the event of the price of coal and rate of wages being increased. The Committee directed the Town Clerk to inform the Company that, owing to the great increase in the prices quoted for lighting the street-lamps in the north and south wards, and to the unwillingness of the Company to enter into a contract for less than five years, they were unable to recommend the Council to accept the terms contained in the Company's letter, and had instructed the Gas Engineer to make arrangements for lighting these streets by gas-lamps upon the expiration of the existing contract.

Extensions at Hartlepool.—The provision of further gas-making plant was foreshadowed in the report for the past year which was adopted at last week's meeting of the Hartlepool Gas and Water Company. The total revenue for the year was £155,469, and the expenditure £125,114, leaving a balance of £30,354 on the profit and loss account. The Directors recommended the payment of a dividend for the half year at the rate of 5 p.ct. per annum (less income-tax) on the whole of the paid-up consolidated capital of the Company. The Bill empowering the Company to raise £100,000 of additional water capital, with an increase of borrowing powers in respect of the gas and water capital amounting to £115,800, received the Royal Assent on July 22. The gas sold showed an increase, compared with the previous year, of 25,735,000 c.ft.; and to meet the growing demand, the Board have decided to renew on modern lines (with a larger carbonizing capacity) one of the retort-house benches at the No. 1 gas-works, and to erect an additional water-gas plant at the No. 2 gas-works.

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The Irish Coal Shortage.

The coal shortage in Ireland has become so acute that, apart from the inconvenience and loss on the ordinary industrial side, and the hardship in the case of private consumers, gas-works have, in some instances, had to close-down, and several of the smaller towns are unlighted. A notable instance is Ennis, where this condition has prevailed for some weeks. In Tralee only a few days' supply is available, and in Naas the situation is much the same. Athlone has suffered badly; this important military centre being now without gas, and business at night having to be conducted with lamps and candles, while workers return from their employment with lighted torches. From Roscommon it is reported that the gas-works must close-down unless supplies come along at once. In Balbriggan, the lights have been cut off at 5 p.m., in order to conserve the coal in hand. Dublin's coal shortage has been the subject of keen agitation by the Chamber of Commerce; and it is hoped that an allocation of 40,000 tons per month will ease the position for the city and some at least of the provincial towns. But at the moment transit is a source of trouble, as few steamers can be got to carry the coal from England. The Coal Controller, however, is doing his best to meet the difficulty. In Dublin, the public lights are extinguished at 11.30.

Woodall-Duckham System for Stourbridge.—The Stourbridge Gas Committee recommended, and it was approved by the Town Council last Tuesday, that a set of vertical retorts be installed by the Woodall-Duckham Company. They pointed out that there should always be a margin of power in reserve; and as the demand was likely to increase, the present plant, which was being worked to its utmost capacity, would not be sufficient. The work might probably take twelve months to complete; but it would then have the effect of doubling the make.

Ipswich Gas Light Company.—The accounts of the Company for the year 1919, which were submitted at the meeting last Wednesday, showed that, after providing for fixed charges, there remains a profit balance of £6482. The amount brought forward from the previous year was £11,126, making a total sum of £17,608. From this had to be deducted the interim dividend, amounting to £3502, leaving an available balance of £14,106, out of which the Directors recommended the payment of a further dividend at the statutory rates, which would absorb £3296, and leave a balance of £10,809 to be carried forward. In July the price of coal was advanced; and in consequence of this and the advance in workers' wages, together with the reduction in working hours, the Directors were obliged to raise the price of gas for the last quarter of 1919 by 4d. per 1000 c.ft., making it 3s. 8d. It was stated by Sir Daniel Goddard (the Chairman), at the meeting, that the make of gas per ton had been very good—namely, 14,240 c.ft.—which reflected the greatest credit on the Engineer (Mr. Frank Prentice) and his staff.

Castleford and Whitwood Gas Company.—At the annual meeting of the Company, Mr. T. Gill, who presided, stated that, owing to the scarcity of coal and also the quality, the past year had been a difficult one for all gas undertakings. The expenditure had very largely increased; and the issue of new capital was overdue. As soon as the times were more favourable, the Directors would make arrangements to issue new stock. Under present conditions the Directors considered the results of the past year were highly satisfactory, and reflected great credit on the management. No advance in the charge for gas occurred when the 6s. per ton was put upon the price of coal last July; and a balance of about £500 had been added to the amount carried forward. The output in 1919 was 101 million c.ft., as compared with 87 million c.ft. in 1918. Dividends of 8 p.ct. on the original stock, and £5 12s. on the additional stock for the year were declared.

On the evening of the 26th ult., the Directors of the Portsea Island Gas Company gave a formal welcome to the 300 or so of their employees who have returned from military service. At the outbreak of the war, the Company were employing 639 men; and of these no fewer than 327 were released for naval or military service. Of the total number, 22 lost their lives, and nine gained distinctions. To welcome home these men who had thus served their country afloat and in the field during the past five years, the Directors organized a dinner, which was served in the Town Hall, and at which (including the men, their wives, and the former war women workers) about 1200 sat down. Nor were the relatives of their honoured dead forgotten, for, in addition to an appropriately worded letter from the Chairman of the Company, they were each sent five War Savings Certificates, "as a slight evidence that you will be present in our thoughts." Almost every male member of the various departments was present. Mr. T. H. F. Lapthorne, J.P. (the Chairman of the Company), presided, and was supported by Mr. F. W. Gillman, J.P. (Deputy-Chairman), Mr. F. M. Aylen, Captain F. M. Edgcombe Hellyer, Mr. J. Watson Gieve (Directors), the Mayor of Portsmouth (Councillor J. Timpson, J.P.), the Town Clerk (Mr. G. Hammond Etherton), and many other townsmen. In giving the toast of "Our Guests," the Chairman said this was a unique gathering in the 99 years of the Company's existence. On one or two occasions the Directors had met some of their follow workers, but never on such a large scale as this, and never to celebrate such an occasion. He congratulated the guests on their safe return, and hoped they would agree that the Company had loyally kept the promise they made at the commencement of hostilities to reinstate them without loss of position or pay. Never since his association with the Company had the relations between the executive and the staff been more cordial than they were to-day. At the close of the evening, the Chairman proposed a vote of thanks to Mr. T. Carmichael (the Engineer) and Mr. H. A. Stibbs (the Secretary) for the work in making arrangements for the dinner and entertainment. An interesting souvenir containing a Roll of Honour had been prepared for the occasion.

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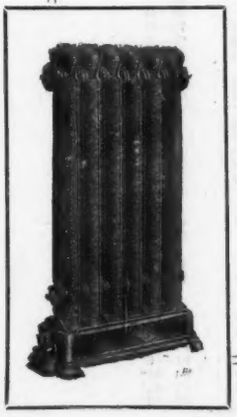

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SALES DEPT. **60, Oxford Street, London, W. 1.**

The Gas Committee of the Dundee Town Council have been notified by the Coal Controller that coal used for the manufacture of gas for the purpose of street lighting does not secure the 10s. reduction allowed under the Coal (Pitmouth) Prices Order, 1919.

The accounts of the City of Chichester Gas Company for the last half of 1919 revealed an exceptional increase in sales of gas of 14½ p.ct., together with a big expansion in the value of the residual products; but unfortunately the largely enhanced cost of coal, labour, and materials exceeded the increased revenue, with the result that the profit balance was slightly less than that shown in the corresponding half of the previous year.

Applications are frequently received at the Department of Overseas Trade (Development and Intelligence), No. 35, Old Queen Street, S.W., from firms in all parts of the United Kingdom and abroad, who wish to get into communication with British manufacturers or producers of various classes of goods with a view to obtaining supplies. An application has been recorded during the past week for the names of manufacturers of water-gas pitch. British makers now in a position to supply are invited to apply for the name of the inquirer.

The South Staffordshire Mond Gas Company have notified their customers that, unless better supplies of coal are forthcoming, they cannot maintain the present output of gas. Various firms in Wolverhampton, Tipton, Bilston, Walsall, and Willenhall rely upon the Company for their power; and a serious industrial crisis may therefore arise.

An animated discussion took place at a special meeting of the Leicester City Council last Tuesday upon a proposal brought forward by the Wages and Salaries Committee that the remuneration of Mr. Hubert Pooley, the Gas Engineer, should be increased from £1250 to £1550 as from July 1 last. In the absence of Sir Jonathan North, the adoption of the report was moved by Mr. W. K. Billings, who, as a member of the Gas Committee, heartily supported the recommendation—saying he believed Mr. Pooley was one of the best gas engineers in the country. Since he had been with the Corporation there had been a 25 p.ct. increase in the quantity of gas sold. An amendment to refer the report back for further consideration was defeated by 38 votes to 13; and the Committee's recommendation for increasing Mr. Pooley's salary by £300 annually was adopted by 32 votes to 19.

STOCK MARKET REPORT.

The Stock Exchange has had a disappointing week. So far from any recovery from the flatness of its predecessor, the condition in at least most of the chief markets went from bad to worse, and fresh records of low prices were superadded to the poor figures of the week before. The moving influence is money; and the money outlook is a baffling problem.

The gilt-edged market was a heavy sufferer. Home Government issues were sold freely, not to say wildly. The depth of the fall will be apparent from the closing day's figures—viz., Consols 49⅜-50, War Loan 87⅞-88⅛, Funding 69⅝-70½, Victory 80¼-81¼. Bonds went the same way.

Home Rails were very quiet, there being little disposition to venture either way in present circumstances. Canadians were lower, and Argentines were pulled down by realization of profits.

The Foreign Market had but a poor time. French Loans were very flat, weighed-down by the Ossa of the railway strike upon the Pelion of the Exchange. But there was some inquiry for Russians; while Japanese and Brazilian had friends.

In the Miscellaneous Market, new concerns and combinations of concerns were the chief interest. Rubber was fairly firm on the whole, and Nitrates did well until profit-snatching set in. Among the rest, movements were mostly irregular.

Business in the Gas Market was rather less abundant than the week before, and by far the greater part of it was in Gas Light and Coke and South Metropolitan issues. The ordinary stocks of these gained another point each in quotation. Commercial was steady. A large number of Suburban and Provincial companies were quoted *ex div.* at about corresponding figures; but Bournemouth 10 p.ct. was substantially lowered. In Continentals, Imperial was little dealt in and was weaker—the quotation closing 3 lower. Primitivas also were neglected, and the quotation of the preference shares fell ¼.

Bargains done for cash during the week were as follows: On Monday, Brentford "B" 45, 45½, Cape Town debenture 59, European 9½, Gas Light ordinary 58½, 59, 59½, 60, ditto maximum 39, ditto debenture 50, 50½, Monte Video 75, Primitiva 31s., ditto preference 77s. 6d., South Metropolitan 58½, 59, 59½, 59⅝, Tottenham "B" 51, 52, Bournemouth 3 p.ct. debenture 47½, Ipswich "B" 99. On Tuesday, Brentford "A" 48, Continental Union 27, Gas Light ordinary 58½, 59, 59½, 59⅝, 60⅛, ditto preference 61, Imperial Continental 133½, 135, Monte Video 74, 75, Primitiva 33s., South Metropolitan 59, 59½, 60⅛. On Wednesday, Commercial 3½ p.ct. 50, Gas Light ordinary 59, 59⅝, 60, 60½, 61, ditto maximum 40, ditto debenture 50½, 51, 51½, Imperial Continental 133, Monte Video 73, Primitiva preference 72s. 6d. On Thursday, British 26⅜, 26½, Commercial 4 p.ct. 56, Gas Light ordinary 59½, 60½, ditto maximum 40⅜, ditto preference 61, Imperial Continental 132½, 134, Monte Video 75, Primitiva 32s. 6d., South Metropolitan 59½, 59½. On Friday, Gas Light ordinary 59½, 59⅝, 60, 60½, 60⅜, 60½, Imperial Continental 132½, 133½, Primitiva preference 73s. 9d., 75s., 75s. 7½d., South Metropolitan 59, 59½, 59⅝, Tottenham "B" 50.

In the Money Market, there was apprehension in the earlier part of the week that a rise in the Bank rate was imminent, and quotations hardened accordingly. Later, the uneasiness assuaged, and rates relaxed. The Bank rate is 6 p.ct., as fixed on Nov. 6, 1919.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares	When ex-Dividend.	Ante-War Dividend & Bonus. p.c.	Last Dividend.	NAME.	Closing Prices. July 26, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	July 31	4	4%	Aldershot 4 p.c. Pref.	..	60—65	..
1,561,868	"	Sept. 26	2½	2½%	Alliance & Dublin Ord.	82—84	43—48	..
274,000	"	Jan. 15	4	4%	Do. 4 p.c. Deb.	76—79	61—63	..
280,000	5	Oct. 30	7½	5%	Bombay, Ltd.	5⅞—6⅛	5—5½	..
50,000	10	Feb. 26	15	10%	Bournemouth Gas (10 p.c.	20—30	8½—9.*	..
553,110	10	"	7	7%	Bournemouth Gas (B 7 p.c.	15—15½	8½—9½*	..
116,200	10	"	6	6/-	and Water (Pref. 6 p.c.	13½—14	9—9½*	..
162,065	—	Dec. 30	—	4%	and Water (4 p.c. Deb.	..	64—66	..
992,046	Stk.	Feb. 12	14	30/-	Brentford A Consolid.	231—266	48—53	48
784,929	"	"	11	26/8	Do. B New	204—209	43—48	45—45½
55,000	"	"	6	6%	Do. 5 p.c. Pref.	109—111	74—76	..
221,400	"	Dec. 11	4	4%	Do. 4 p.c. Deb.	91—93	64—66	..
214,775	"	Sept. 11	11	7½%	Brighton & Hove Orig.	205—218	123—128	..
344,200	"	"	8	5½%	Do. A Ord. Stk.	154—159	84—89	..
1,287,500	Stk.	—	5	5%	Bristol 5 p.c. max.	..	..	..
680,000	10	Sept. 26	12½	10%	British	44—45	25—27	26⅛—26½
192,000	Stk.	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	88—90	61—63	..
945,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	47—50	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	6½—7½	..
160,000	10	Oct. 30	—	4½%	Do. 4½ p.c. Pref.	4—6	6½—7	..
100,000	Stk.	Dec. 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	58—63	59
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,518,380	"	Feb. 26	5/9/4	88/4	Commercial 4 p.c. Stk.	106—108	54—59*	56
660,000	"	"	5½	26/8	Do. 5½ p.c. do.	108—106	50—55*	50
475,000	"	Dec. 11	3	3%	Do. 5 p.c. Deb. Stk.	69½—71½	49—51	..
800,000	"	"	4	—	Continental Union Ltd.	76—79	27—32	27
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	40—60	..
51,600	Stk.	Feb. 26	14½	10½%	Croydon A 10 p.c.	..	130—140*	..
278,400	—	"	11½	7½%	Croydon B and C 7 p.c.	..	90—100*	..
492,270	Stk.	—	5	5%	Derby Con. Stk.	128—126	..	..
55,000	"	—	4	4%	Do. Deb. Stk.	102—104	..	..
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	9½—10½	9½
16,298,975	Stk.	Feb. 12	4/17/4	80/-	Gas (4 p.c. Ord.	98—102	58—61	58½—61
2,600,000	"	"	8½	26/8	Gas (8½ p.c. max.	76—79	40—45	39—40½
4,062,235	"	"	4	4%	Light (4 p.c. Con. Pref.	96—99	59—62	61
4,874,850	"	Dec. 11	8	8%	and (5 p.c. Con. Deb.	72½—74½	50—52	50—51½
180,000	"	"	10	10%	Coke (10 p.c. Bonds	..	..	..
82,500	"	Sept. 11	5	3⅜%†	Hastings & St. L. 5 p.c.	..	57—62	..
958,740	"	"	3½	2⅜%†	Do. 3½ p.c	37—39	40—45	..
70,800	10	April 29	11	7%	Hongkong & China, Ltd.	16½—16¾	8½—9½	..
56,600	Stk.	Aug. 28	9	3½%	Hornsey 7 p.c.	..	90—95	..
181,800	"	Sept. 11	7½	5⅜%	Ilford A and C.	151—154	88—93	..
65,780	"	"	6½	4⅝%	Do. B	115—118	67—72	..
65,500	"	Dec. 30	4	4%	Do. 4 p.c. Deb.	92—94	59—63	..
4,940,000	"	May 14	9	4½%	Imperial Continental	156—160	132—137	132½—135
1,325,000	"	Feb. 12	8½	3½%	Do. 3½ p.c. Deb. Red.	84—86	85—90	..
335,243	"	Sept. 11	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	86—91	..
2,498,986	"	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. (A	211—218	..	..
					Liverpool 5 p.c. Ord. (B	146—148		
806,068	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
165,736	"	Feb. 26	7/5/6	32½%	Maidstone 5 p.c.	..	54—59*	..
75,000	5	June 11	6	8%	Malta & Mediterranean	4½—4¾	1½—2½	..
250,000	100	Oct. 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	90—97	..
541,230	Stk.	Nov. 27	4	5%	Monte Video, Ltd.	11½—12	72—77	73—75
1,575,892	"	Feb. 26	4½	3½%	Newcastle&Gatsh'd Con.	96½—99½	63½—64½*	..
339,705	"	Dec. 30	3½	3½%	Do. 3½ p.c. Deb.	87—88	56—57	..
15,000	10	Sept. 11	—	11%	North Middlesex 10 p.c.	..	13½—18½	..
55,940	10	"	7/14/0	7%	" " 7 p.c.	14—15	9—9½	..
900,000	Stk.	Nov. 27	8	8%	Oriental, Ltd.	117—122	102—105	..
50,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	4½—5½	..
60,000	50	Aug. 28	18	7½%	Portsea, Island B	128—131	68—73	..
100,000	50	"	12	6½%	Do. C	118—121	55—60	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	1½—2	31/—33/-
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4½—5	3 - 3½	72/6—77/6
821,600	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	91—96	70—72	..
600,000	Stk.	Jan. 29	4	4%	Do. " " 1911	..	48—51	..
846,198	"	Dec. 30	4	4%	River Plate 4 p.c. Deb.	85—87	47—50	..
150,000	10	Sept. 26	6	6/-	San Paulo (5 p.c. Pref.	10½—11	7½—8	..
125,000	50	Dec. 30	5	5%	San Paulo (5 p.c. Deb.	47—49	39—41	..
135,000	Stk.	Aug. 28	10	5%	Sheffield A	223—224	75—80	..
209,984	"	"	10	5%	Do. B	222—224	75—80	..
526,500	"	"	10	4½%	Do. C	220—222	75—80	..
138,201	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	..	..	..
99,000	10	Oct. 15	9	10%	South African.	10½—11½	12—13	..
6,009,895	Stk.	Feb. 12	5/4/0	30/-	South Met. 4 p.c. Ord.	111—115	58—61	58½—60½
250,000	"	Jan. 15	—	5%	Do. Pref.	..	93—95	..
1,895,445	"	"	8	8%	Do. 3 p.c. Deb.	72½—74½	50—52	..
294,820	"	Feb. 26	3½	3%	South Shields Con. Stk.	157—159	103—105*	..
1,087,795	"	Aug. 14	6	3½%	S'th Suburb'n Ord. 5 p.c.	114—116	66—71*	..
247,558	Stk.	Dec. 30	6	5%	Do. 5 p.c. Deb. Stk.	116—118	78—83	..
647,740	"	Nov. 18	7½	3½%	Southampton Ord.	99—103	61—63	..
131,275	"	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	..	61—63	..
120,000	"	Aug. 14	—	3½%	Tottenham (A 5 p.c.	125—126	63—73*	..
769,275	"	"	6	2⅝%	Tottenham (B 3½ p.c.	115—117	48—53*	50—52
151,255	"	Dec. 11	4	4%	District (4 p.c. Deb.	87—89	53—56	..
129,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	46—50	..
236,476	Stk.	Sept. 26	5	3½%	Tynemouth 5 p.c. max.	108½—109	74—76	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	"	Feb. 26	3½	55/-	Wandsworth A 5 p.c.	151—156	83—88*	..
256,686	"	"	6¼	40/-	Do. B 3½ p.c.	129—134	61—66*	..
108,075	"	"	—	33/6	Do. C	..	61—66*	..
140,865	"	"	—	33/6	New Ordinary	..	61—66*	..
359,000	"	"	6¼	33/9	Wimbledon 5 p.c.	117—123	63—68*	..
98,000	"	"	6¼	40/-	Epsom 5 p.c.	131—136	63—68*	..
88,416	"	Dec. 30	5	5%	5 p.c. Deb. Stk.	66—69	48—50	..

* Ex Div. † Next dividend will be at this rate.